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SUBSEA FREIGHTER "DEUTSCHLAND" FULLY DESCRIBED IN THIS ISSUE

MOTORSHIP

In the Interests of Commercial Motor Vessels

Vol. I SEATTLE, U. S. A., AUGUST, 1916 No. 4

M. S. "DEUTSCHLAND" AND CAPTAIN KOENIG *Photos Copyright International Film Service*

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M. S. "DEUTSCHLAND," FIRST SUBMERSIBLE MERCHANTMAN

Scene of Deck of "Deutschland" Entering Chesapeake Bay.

Presenting Loving Cup to Captain Koenig

"Deutschland" Passing In at Baltimore

Approaching the Dock

Ready for the Landing

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Story of the Submersible Freighter "Deutschland"

If technical men have seemed somewhat grudging in their praise of the performance of the submersible cargoboat "Deutschland," this may be properly credited to their natural resentment that public acknowledgement of the strides which have been made in undersea engineering in the past decade should have been so belated. Unquestionably there is something ironical in the layman's fulsome praise of one conspicuous example of that to which he has heretofore been indifferent and at times hostile. Some very fine engineering and marine construction organizations have labored long and patiently with the United States government to bring about this sort of development in our own country with, up to the present time, very little outside public co-operation.

The achievement of the "Deutschland's" will live in history as one of the finest types of human accomplishment. The supreme test, however, was really one of men rather than machinery. To Captain Paul König and his crew, for their bravery and endurance, and to Mr. Alfred Lohmann, ex-president of the Bremen Chamber of Commerce, and his associates, for their patriotism and unselfish enterprise, belongs the credit for his remarkable performance which in daring and originality will stand forth as one of the things about the Great War long to be remembered.

The "Deutschland" is unique in that she is the first commerciable submersible ever constructed, and the first undersea boat to cross the Atlantic without convoy, the only previous transatlantic passage having been made by a flotilla of American-designed, Canadian-built submarines which crossed to England with cruiser escort.

How the "Deutschland" Came to Be Built.

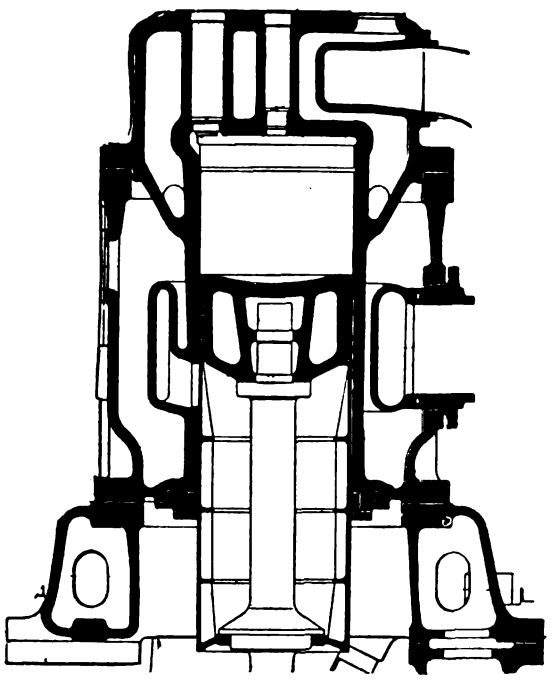
Contrary to the widely published report, the Deutschland" is not a converted naval submarine, ut was specially built for the trade in which she as engaged. The idea of breaking the British lockade with the aid of such a vessel was conceived by Mr. Lohmann nearly two years ago, but is plans did not materialize until August last, hen he was able to convince the Deutsche Bank nd the Norddeutsche Lloyd, which cooperated ith him in financing the venture, that the war ould last at least another year. Preliminary esmates based on conditions existing at that time, nd they were conditions which have since been reatly aggravated, showed that a vessel of this pe could be built for roughly $500,000 and would ay for herself in one round trip.

From an engineering standpoint, contrary to ie public impression, the venture presented no nsurmountable difficulties. Naval experience had stablished the many standards of practice which ere necessary and it was largely a question of lapting the design which had been previously oneered by the Germans themselves to the mewhat different requirements.

These facts being established, the Deutsche zean Rhederei, G. m. b. H. (German Ocean ransportation Co., Ltd.) was organized with a ominal capital, articles of incorporation being ed November 8, 1915, with the following as rectors: Alfred Lohmann, president of a large porting company in Bremen and a prominent ure in international trade; Philipp Heiniken, rector-general of the North German Lloyd; P. . Hermann, manager Deutsche Bank, Bremen. id Carl Stapelfeld, manager of the North Gerin Lloyd, the latter also acting as manager of e undersea boat line. Arrangements were made r representation in the United States by the orth German Lloyd through Charles von Heldt, of New York, American manager of the line. . Schumacher & Co., of Baltimore, were the local ents in charge of details, this work being carred on by Henry G. Hilken, president of the company, and his son, Paul L. G. Hilken, vice-president.

Construction Details.

When once the building of vessels of this type had been determined by the Bremen group, little time was lost. The same month keels were laid and the framework begun for the "Deutschland" and her sister ship, the "Bremen," at the Germania Shipyard in Kiel Gaarden, owned by Friedr.



KRUPP DIESEL ENGINE
Cylinder Cross Section of Type of Engine Installed in "Deutschland"

Krupp A. G. About five months were consumed in completing the "Deutschland." The facilities of the Krupp plant are such that one vessel of this type can be turned out a month without difficulty.

The "Deutschland" is 313 feet long, 30 feet on the beam, with a depth of 17.08 when awash. She is of 791 gross and 447 net tons measurement. with a displacement of approximately 2,000 tons. She requires 32 feet for complete submersion. Even superficially she differs considerably from naval submarines, as she was given a greater beam, particularly at the surface, in proportion to her length. Lying with her decks awash, she looks not unlike a Great Lakes whaleback, having a raised deck six feet wide and two feet above the top places running from stem to stern and tapered at either end. The higher she is out of the water the more apparent it becomes that her outer hull is built along the same lines as an ordinary surface type designed for speed. When her cargo had been discharged at Baltimore and she lay with four rows of plates above the surface and drawing only 14 feet, she looked very much like a speedy steamer without upperworks. Her bow is very sharp and without sheer. It flares back in the usual fashion for fifteen feet and is then cut away sharply to meet the rounded sides of the midship section of the hull. The outer hull, which was painted a dark green in order to make her inconspicuous, is a shell only, and is designed simply to give her better lines, surface speed and a certain amount of stability. The inner hull which it encases is of the usual tapered cylindrical shape and is designed to withstand the usual pressures. Perforation at various points in the outer hull, some of them long, narrow slits, permit the access of water to the inner hull. As in the case of the more modern naval submarines, the bridge is a permanent structure with a V shaped flaring metal shield to protect the navigators when occupying it. The bridge is located somewhat abaft the midships and is about twenty-five feet from the water surface operations. The vessel has two portable telescoping steel masts, forty feet tall, which are fitted into sockets on the starboard side, next the running deck. These masts are secured by two steel guys and the forward one carries a lookout which is reached by a wirerope ladder. These masts carry a wireless aerial and the "Deutschland" is equipped with a set having a radius of about 200 miles for receiving and half that distance for sending. Forward of the conning tower is stored a life boat provisioned and equipped for twenty-three men, while just aft of the conning tower a small work boat is stored and this will accommodate six men only, so that it is obvious that the "Deutschland" will not be allowed to carry passengers on her return trip to Germany, despite the tempting offers which are known to have been made. The "Deutschland" has three hatchways, one forward, one amidships through the conning tower, and one abaft the conning tower. She is provided with tackle and electric motors for hoisting cargo.

The interior arrangements of the "Deutschland" differ considerably from those of naval submarines, but their adaptation to this service presented no severe difficulties. The fact that from the very first it was decided to carry absolutely no armament on the boat made at once considerable extra space available for cargo room. The elimination of from eight to twelve torpedo tubes as carried by the modern naval submarines, together with the space devoted to the torpedo nest, ammunition for the rapid-fire guns mounted on deck was a big gain. Speed not being essential in a merchantman and long-submerged runs not being anticipated, the "Deutschland" was able to use smaller engines and smaller storage batteries than the fighting boats. Special cargo space was provided for in the room between the passageways and quarters, and the hull at the bulge along the sides, and in a hold below the quarters, and at the bow and stern. Roughly, one-third of the cubic space of the boat is given over to cargo space, it being possible for her to carry about 650 tons. The "Deutschland" carried about 300 tons of scrap iron ballast. She has only one between deck and is divided into five sections by transverse water-tight bulkheads. Two long passageways two and a half feet wide and less than six feet high run fore and aft. The entire interior fittings are of metal and space has of course been allotted with the greatest care. Captain König's room is scarcely six feet square.

Her engines are two 600 b. h. p., six-cylinder, two-cycle Krupp-Diesel type heavy oil engines, and while no one has been allowed to see them, excepting the U. S. officials, there is no reason to assume that they differ from the usual submarine engine turned out at the Krupp works. On the 16-day voyage these engines sometimes drove her at 14 knots, but, of course, the average was much less, and only 85 tons of fuel were used, so that she had enough oil left in her bunkers for the return voyage.

The Krupp submarine engine is of the two-cycle type, and is particularly noteworthy for the bronze construction; the crankcase, cylinders, and cylinder heads being of a very high-grade bronze, and into the cylinders cast-iron liners are pressed. The cost of construction is, of course, enormous. It is of the trunk-piston type without crossheads and guides, and the crank-pit is entirely enclosed, and forced lubrication adopted.

Port scavenging is adopted, scavenging-air being supplied at 3 lbs. per sq. inch. from double-acting pumps, situated at each end of the engine. The general construction is simple, there being only

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two valves per cylinder, and these are set in an inclined position on the cylinder heads, which are domed V shape. One of these is the fuel-injection valve, and the other is the air-starting valve. The air-compressors for starting and fuel injection are arranged between two groups of three working cylinders. The camshaft operating the valves is actuated by gearing and a vertical shaft in the center of the engine, operated in turn by the crank shaft.

For reversing a sliding camshaft is adopted, the camshaft carrying two sets of cams, one for ahead and one for the astern motion. To reverse the engine the camshaft is moved axially, bringing the proper cams under the valve-rocker rollers. Possibly in the case of the "Deutschland" the reversing mechanism has been omitted, and reversing carried out by means of the electric motors. The latter, of course, are also used for running the ship when submerged.

Included in the "Deutschland's" special equipment are two microphones, one on the port side forward and the other in a corresponding position on the starboard. They are used for the purpose of detecting the presence of other vessels. So satisfactory is the arrangement that it is possible for the man at the central control station to determine from the sounds registered whether the vessel is a merchantman, cruiser or destroyer, owing to the various propeller speeds of these craft. She has two periscopes and the usual manometers, etc.

For taking soundings, a tube projects through the bottom of the hull, through which the lead of the sounding machine can be dropped and a series of valves prevent the inrush of water. Rumor has it that she carries a couple of microphones for detecting the sounds made by the propellers of passing ships.

"Deutschland's" Status.

On her trial trips the "Deutschland" developed a speed of 18.2 on the surface and 12 knots submerged, but in ordinary practice she develops 14 knots on the surface and 7½ knots submerged.

The only thorough examination of the "Deutschland" during her visit was made by a United States naval board of experts instructed to determine whether or not she was entitled to be classed as a merchantman. This inspection was carried on by Captain Charles F. Hughes, of the general board of the navy, formerly chief of staff under Admiral Fletcher; Lieut. J. O. Fisher, of the Bureau of Steam Engineering, who conducted the inquiry into the explosion on the American submarine E-2 in the New York navy yard several months ago, and Lieut. Herbert S. Howard, a naval constructor. Captain Hughes stripped to the waist and examined everything on board except a water tank under the engines and the oil compartments. At the conclusion the following report was wired to Washington by Collector of Customs William P. Ryan, who accompanied the party of experts:

"In company with Captain Hughes I have made a thorough inspection of the 'Deutschland.' All spaces except those occupied by cargo and oils were visited. There is no evidence that this ship is armed or can be armed without extensive structural changes. I reaffirm my statement of yesterday that this ship is a merchant vessel."

So insistent was Alfred Lohmann on this point that when the "Deutschland" left Kiel he refused to allow her captain to carry the usual revolver.

While the arrival of the "Deutschland" caused a great surprise throughout the country, it had been anticipated for some time in official circles. A news story had been printed saying that a German submarine was due to arrive in the United States with a message for President Wilson some time during July, but the assumption was that this was a naval submarine. The vessel's manifest was issued by United States Consul William Thomas Fee at Bremen on June 13, but at the request of the Germans Mr. Fee said nothing, and if he communicated this information to the state department it was only unofficially. As early as July 3rd the matter was taken up by M. Jusserand, the French ambassador, and shortly afterwards by the secretary of the British legation in an effort to prevent the recognition of the "Deutschland" as a merchantman.

Log of the Undersea Freighter.

Such details of the voyage as are obtainable are very interesting. She was launched during April and went through very exhaustive tests in Kiel Harbor. Manned by some of the men who assisted in her construction and others trained in naval work, the "Deutschland" was put through her paces many times. Following this her crew for the trans-atlantic voyage was taken aboard and a thorough course of training for them followed. This work was completed on June 12th and the following day the United States Consul at Bremen, Mr. Fee, certified her manifest and issued the necessary documents, the vessel clearing for Boston and/or other Atlantic Coast ports on June 13th. She was visited by Prince Henry of Prussia, brother of the German Emperor, who wished her captain and crew God-speed. The "Deutschland" left the following day for Heligoland, where she remained for nine days, during which time further trials were conducted. The real purpose of this stay, however, was for the purpose of conferring with the German naval authorities concerning the location of mine fields, etc., concerning which Captain König was fully informed, and in order to throw the patrolling cruisers off the scent.

The great danger to be confronted, of course, was the presence of large numbers of nets in the English channel, as there is no more serious menace to submarine navigation. With her wheel once fouled in these nets the submarine is helpless, and either rises to the surface to fall a ready prey to waiting destroyers or else she is unable to rise and her crew dies of suffocation. With a view to minimizing the danger Captain König made his way through the North Sea around the north of Scotland. After this he followed the merchant course taken by the North German Lloyd boats in time of peace and varied from it only once. A total of 4,100 miles was covered. At one time in the North Sea in a spot where the charts showed a good resting place Captain König dropped to the bottom to avoid hostile cruisers and remained there for some hours.

When six hundred miles of the Virginia coast the "Deutschland's" observers sighted a vessel which looked as though it might be a watcher for the enemy, so Captain König submerged and put back to sea for a distance of 200 miles. She did not rise to the surface again until 100 miles from the coast. Cape Henry was finally sighted on the ninth of July at 1:20 a. m., and here the tug Thomas Timmins, belonging o the Eastern Forwarding Company, took the "Deutschland" in tow and brought her to Baltimore. The Timmins, which belongs to the Eastern Forwarding Company, had been specially altered in order to allow her to tow the Deutschland alongside and had been patrolling the capes for days. The "Deutschland" reached Baltimore at 11 p. m. that night.

Before leaving Bremen the "Deutschland" took on 180 tons of fuel and 20 tons of fresh water and on her arrival in Baltimore she had left 95 tons of oil and 10 tons of water. At Baltimore 16,266 gallons of oil were taken on, giving her a cruising radius when ready for departure of some 13,000 miles. The trip was completed in sixteen days and a maximum speed of 14 knots was attained.

Mechanically she came through the trip in very creditable shape. In Baltimore several pistons were removed from one engine for repairs but no extensive overhauling was required.

Simon Lake, of Bridgeport, Conn., came to Baltimore for a conference with the line's agents immediately upon the arrival of the Deutschland and it was rumored that Mr. Lake would libel the vessel and bring action for patent infringements, but the differences, if any, were amicably adjusted.

It has been charged by the Allies that the "Deutschland" was convoyed by a steamer flying the Norwegian flag. The American state department was informed that a British steamer putting into the Canary Islands had sighted on June 23rd in the Atlantic a large submarine bound eastward in convoy of a steamer. None of these reports have, however, been given any credence.

The Personnel.

As has been previously stated, the chief test was one of men rather than machinery, the stability and seaworthiness of submersibles have previously been quite firmly established by long tests. The circumstances are most trying when running on the surface, particularly in bad weather when open hatches cannot be permitted. The racing of the engines, the singing of the ventilator fans and the many minor noises resulting from the unusual frame stress of a maiden voyage made the trip a very trying one. The moist heat below decks kept the men constantly bathed in perspiration, and although only required to be on duty four hours for every eight hours off, the noise was such that rest was impossible until actual exhaustion came. Throughout the voyage the men below wore little more than trousers and thin undershirts. Submerged, however, the situation was much better. The drum roll of the engines being supplanted by the quiet humming of the motors and the ventilators being stopped. Pleasant weather with an opportunity for surface cruising with open hatches and a chance to be on deck was most welcome to all.

In view of the strain which the complement of the "Deutschland" was submitted to, it is interesting to note the care which was used in selecting her crew. Of her three officers and twenty-six men only the captain, supercargo and steward were over forty years of age. Captain König 48, Supercargo Prusse 45, and Steward Stuke 5[illegible]. These men were of course chosen because of their special training. The other officers and men (first and second officer, four engineers, six engineer apprentices, six mechanics, five sailors, wireless operator and cook) range from 20 to [illegible] years and are physically perfect specimens.

Captain Paul König was formerly commander of the steamers "Neckar," "Schleswig" and "Princess Irene" of the North German Lloyd. He will probably have a larger vessel after the war. Though a member of the Naval Reserve, according to the German system, he has had no naval experience.

Supercargo Prusse had charge of the stowing of the "Deutschland's" cargo, a very delicate operation, which had to be calculated to a nicety. He will not return wih the "Deutschland," but will remain in this country to load other vessels of the line on their return trips.

The crew were handsomely paid and received a bonus from the owners. They were royally entertained throughout the East and were the recipient of a number of gifts, the most valuable of which, $10,000 in cash, from Adolph Hecksche[illegible], a New York tin plate magnate, was turned over to the Red Cross society by unanimous vote of the men.

"Deutschland's" Trip as an Achievement.

The voyage of the "Deutschland" is significant as an achievement by comparison with other submersible performances and it has a potential value industrially and economically to the German people which is not to be lightly estimated. It has a general public value in this country in that it will not only focus the attention of the people upon the question of preparedness to a greater degree as an illustration of what could have been done by a fleet of hostile submarines. The greatest immediate good to us will probably come, however from the heightened interest in the evolution and perfection of the heavy oil motor, a task which we have left almost entirely in the hands of our foreign cousins.

The first long sea voyage was undertaken by a German submarine, the U-51, which in the spring of 1915 made her way through the British line of nets and obstacles at the Straits of Gibraltar arriving at the Dardanelles after a voyage of [illegible] days from Wilhelmshaven, Germany. She torpedoes the battleships "Majestic" and "Triumph" which sank in six minutes. The total distance covered by the U-51 was 3,282 miles and the voyage marked a new epoch in submarine achievement.

Late in June, 1915, a flotilla of ten American-designed English submarines made the trip across the Atlantic from Quebec to Plymouth without mishap. They traveled in two divisions of five each under escort of a cruiser. Four other British submarines in August of the same year made the voyage from Montreal to Gibraltar under escort without accident.

A few months later, October 3, 1915, four submarines of the K type belonging to the United States Navy made the voyage from Seattle to Honolulu across the Pacific safely to replace the F type of submarines after the F-4 had sunk there during maneuvers with the loss of her entire crew. The distance of 2,100 miles was covered in 11 days.

The E-14 British submarine made the voyage from Devonport to the Dardanelles and forced its way through the narrow fortified straits into the Sea of Marmora where it torpedoed a Turkish transport anchored in the Bosphorus opposite Constantinople and returned to Lemnos Bay unscathed.

The E-11 followed with a forty-six days' cruise to the Mediterranean and was at one time submerged for forty consecutive hours.

A severe test of the modern undersea fighter was made by the Italian submarine Nereida, which was pursued by six Austrian torpedo boat destroyers in the Adriatic, and had to submerge and lie on the sea bed for seventy hours. Although the crew of the Italian vessel had plenty of air, several of the men collapsed on account of the weird silence in their surroundings, seventeen fathoms below the surface of the water, which, together with the lack of daylight, upset their morale.

(Continued on Page 21)

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Practical Phases of a Submarine Merchant Service

By G. C. DAVIDSON*

The arrival of the German submarine freighter, Deutschland, in Chesapeake Bay, a few days ago, was unquestionably a surprise to laymen generally, but was no surprise to the officers and staff of the Electric Boat company. The only surprise felt by the designers and builders of submarines in this country was, that such a vessel as the Deutschland had not been built and put into operation at least a year ago. At the outbreak of the European war the Electric Boat company put in hand the designs of cargo vessels. The smallest of these was of 2,000 tons submerged displacement and the largest 5,500 tons. This largest size was limited by the depth of water in certain localities, where such a submarine would have to operate if carrying goods between United States ports and belligerent countries. An even larger size would be quite feasible for deep-sea work, but such larger vessels would run the risk of capture through not being able to submerge in some of the shoaler places through which they might have to pass.

From a purely practical and commercial standpoint the establishing of a submarine merchant service between Germany and the United States appears quite practicable and, in the event of the war lasting a sufficient length of time, it seems probable that many German submarine freighters will be employed to evade the blockade of the Allies. The needs of Germany are probably so extreme that, in case her building facilities permit, it would pay her to build a large fleet of these vessels. It has been reported that even one trip paid for the Deutschland. This does not seem improbable when we take into consideration the scarcity of certain German chemicals in the United States and the enormous prices at which they are now selling. But even a greater incentive is the need of certain of our products by Germany, such as copper, nickel, rubber, cotton, condensed milk and fats. We do not know positively at what these various products sell in Germany, but we do know that in the case of some of them the German government has placed limits and where the products can be obtained, this limiting price is only too gladly paid. For examp'e, the limiting price on cotton is a dollar a pound, whereas it can be purchased in this country today for thirteen cents per pound. Roughly speaking, the returns from one cargo of cotton would pay for a submarine freighter.

While the plan of carrying on trade by these under-sea vessels is considered practicable, yet it must not be concluded that there is no risk involved. There is a decided risk. This risk is principally in European waters, where the Allies have large fleets of patrol boats and where they make great use of nets and mines. It is to be expected that occasionally one of these freighters will be captured or destroyed by the enemy. Just what the reasonable proportion would be is difficult to state. If we look back on the record of the German fighting submarines, consider the number of boats they were operating in hostile waters and contemplate the proportion which were captured or destroyed by the Allies, it does not look as though the chances are very large against the under-sea freighters. While we have no definite figures to go by, we have been given the impression from various reports obtained from various sources that, during the height of the activities of the German fighting submarines, these vessels remained at sea in the enemies' waters from ten to twelve days at a time. We have also been informed that the number of boats at sea at one time averaged about twenty-five. Assuming that, during the entire operations of the war, about twenty-five German submarines had been either captured or destroyed, the chances of any one boat being captured or destroyed on any one trip would be roughly one in three hundred. That is to say, if the chances were the same for a submarine freighter, the probabilities of one being destroyed while traversing the danger zone would be about the same, namely one in three hundred. While these chances would appear large to the ordinary layman and would, in fact, be large to any of us individually, yet when applied to business of this important nature, they become so small as to be hardly worth consideration.

While in the open sea the submarine runs but little risk because it can choose a route out of the usual line of traffic, so that even when running on the surface, it is not likely to be observed by the enemies' scouts. In the event of its being observed it can always submerge and thus avoid detection. When approaching or leaving the coast of the United States, the danger is small because once inside of the three-mile limit, the submarine is immune from attack. Outside of that limit the submarine will have to take care of itself but, as it has such a wide latitude in which to operate, it would have little difficulty. Moreover, it would be difficult for the Allies to maintain off our coast a very large force for the purpose of apprehending these submarine blockade runners. Taking all of these facts into consideration, it is seen that the greatest danger to the submarine is in the waters of the North Sea and the English Channel. Of the dangers there the mines and nets are probably the greatest, and, in case a number of these freighters are built, we shall undoubtedly hear of some of them being captured or destroyed by their enemies.

From a purely commercial standpoint, the enormous profits to be earned by the operation of a line of these vessels is enough to warrant their construction in large numbers. What would intimidate capital more than anything else is the fear of their becoming useless on the termination of the war. This is true to a certain extent, but it is possible to render these vessels still useful even in peace times. Much will depend on the manner in which they are designed. If properly designed, they could readily be converted into surface cargo vessels. On account of their being propelled by Diesel engines, their operation would be very economical. A properly designed freighter could, on the termination of hostilities, be converted, at comparatively small expense, into a surface cargo vessel. To accomplish this her storage batteries, compressed air tanks, electric motors, etc., would be removed. The weight and space thus gained could be used for additional cargo. She could even be fitted up with a deck house and pilot house and would present the appearance, on the surface, of a very fair design of ocean freighter. It is more than likely that a vessel built along these lines and then converted into a surface cargo ship could, at the end of the war, compete successfully with cargo ships of the same size now being built for carrying cargo on the surface only.

*Vice-President of the Electric Boat Company.

STANDARD GAS ENGINE COMPANY TO BUILD DIESEL ENGINES.

The Southwark-Harris valveless oil engine, developed and heretofore manufactured by the Southwark Machine & Foundry company, of Philadelphia, Pa., will be built for Pacific Coast territory hereafter by the Standard Gas Engine company, of San Francisco, which has previously been the western selling agent for this motor. This important announcement, made for the first time through Motorship, is significant in illustrating the rapidly increasing demand for heavy oil engines on the Pacific and to the patrons of the Southwark company means a reduction of fifty per cent in the time of deliveries and the valuable co-operation and service of an experienced Pacific Coast producer on internal combustion engines.

A. B. Barkman, the new vice-president and general manager of the Standard Gas Engine company, and C. C. Kriemler, sales manager, have just completed a personal survey of Pacific Coast territory from California to British Columbia, working out the details of the plan and putting new arrangements into effect. They were joined at Seattle by William Latham Abbott, of Philadelphia, president of the Southwark Machine & Foundry company, and following their conference the following facts were secured for the information of Motorship's readers.

A large amount of new metal working and turning machinery has been purchased for enlarging the equipment of the Standard Gas Engine company's Oakland plant. A technical expert who aided in bringing the Southwark engine to its present state of development at the home plant is on the coast and will superintend production at the Standard plant. Complete specifications and formulas are now on hand and work has commenced on making the patterns for the 9x13 Southwark-Harris engine. This will be built in sizes of from 75 to 300 h. p., the power variation being secured by the addition of extra cylinders. The two-cylinder engine will develop 75 h. p.; four-cylinder, 150 h. p.; the six-cylinder, 225 h. p., and the eight-cylinder, 300 h. p. A number of these engines will be built at once for stock so that delivery on any of these sizes can be made by January 1st, or in about five months. Within sixty days work will be commenced upon the 12x21 engine which will be built in four, six and eight cylinders with 300, 450 and 600 h. p. respectively. It may be considered particularly fortunate that the manufacture of these engines is being taken over by a going concern as the Standard Gas Engine company now has on hand, bought and delivered, sufficient metal to fulfil its requirements for two years to come and has also much valuable machinery of the type which is extremely difficult to secure in war times.

Discussing the producing situation C. C. Kriemler, sales manager, said to Motorship: "Contrary to the generally held opinion, manufacturing conditions upon the Pacific Coast are quite satisfactory. Our own experience has proved that labor conditions are entirely consistent and we have found that the economy gained by being able to operate our plant all year round without added expense during the winter months because of weather conditions gives us a margin for absorbing some of the items that do vary against our local field."

It is interesting to note that Harris, who designed the Southwark engines, has from the first had in mind Pacific Coast heavy duty requirements in building this engine and that he has had the experience of many years of gas engine design. The result is that many features peculiar to the Pacific Coast type of gas engine have been incorporated in the Southwark engine greatly adding to its adaptability for Pacific Coast manufacture. The engine is built to Bureau Veritas requirements.

The Standard Gas Engine company will manufacture and sell for the territory consisting of all states and countries in or bordering on the Pacific Ocean. Sales work will be carried on under the direction of Mr. Kriemler at San Francisco with A. B. Cameron stationed at Seattle with general supervision of Northwest territory and with the title of Northwest Sales Manager. Both men are well known to the trade. Mr. Kriemler has been for years with the Standard company at its San Francisco office, while Mr. Cameron has been one of the most active and capable figures in the industry. The chain of distribution will be completed by the Standard company's regular line of distributors, the Pacific Net & Twine company in Washington, Edward Lipsett in British Columbia, etc. James S. Shuck will be stationed at Los Angeles in charge of Southern California territory.

The Southwark engine enjoys a splendid standing in the trade and, in fact, there are now under manufacture at Philadelphia a number of engines for Pacific Coast delivery. The Southwark Machine & Foundry company is a subsidiary of the Baldwin Locomotive Works, a forty million dollar concern, and one of the most important industrial factors in the United States.

PUGET SOUND SHIPYARD CHANGES HANDS.

The Hall Brothers shipyard, one of the pioneer yards on Puget Sound, has been sold to a new corporation known as the Winslow Marine Railway & Shipbuilding company. James Griffiths, Stanley A. Griffiths, D. B. Trefethen and A. M. Christianer incorporated the new company, which has a capital of $600,000.

The business of the old yard will be continued along practically the same lines and both new construction and repair work carried on. Additions will be made to the plant from time to time as they are needed to handle the growing demands of Puget Sound shipping interests.

Capt. Griffiths is president of the company and C. C. Lacey, formerly with the Great Northern Railway and the Pacific Coast company, will be assistant manager. J. L. Hubbard, who has been in charge of the yard for some time, will continue in his old position.

James Griffiths & Sons is one of the most widely known shipping brokerage companies on the Pacific Coast. They have been acting as loading brokers for Mitsui & Co., who have a fleet of eighteen Japanese steamers in the transpacific trade. Griffiths & Sons also operate the Coastwise Steamship & Barge company, with vessels plying between Seattle, Tacoma and British Columbia.

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Authentic Steam and Motorship Comparisons

By THOS. ORCHARD LISLE
A. M. I. Mar. E.

Ever since the Diesel versus Steam controversy first arose, it has been most difficult to secure comparisons of operating costs that are reliable and authentic, and upon which shipowners and shipbuilders can base their views with the confidence necessary to render such information of value to them in their businesses. Why this is the position easily can be understood, for, few shipowners, either motor or steam, desire to reveal what it costs to operate their vessels because of the benefit that competitive owners would thus derive. Therefore, it has been up to the Diesel engine salesman to put forward what, to a certain extent, are assumptions, and naturally such data has a tendency to be biased. And they—the salesmen—must not be blamed for so doing, for secrecy has been the bane of the motor ship. Bad records leak out in an exaggerated form, while reliability and regularity of service meet with but little publicity. For instance, there are four motor ships belonging to one shipping line that have been maintaining a most regular schedule between Europe and New York harbor, stopping but a few days at each end, yet the splendid performances of these ships, the "Hermes," "Selene," "Artemis" and "Ares," will not go on public record, and practically will be unknown to shipowners in general. Two of them have lately sailed for the Far East. On the other hand, when a motor ship is held up for a week for an alteration or repair, the fact is blazoned far and wide. A study of the steamship weekly mishap list reveals that boiler troubles are quite frequent occurrences, yet the steamship owner today looks on the same with far more tolerancy than he does upon a minor Diesel engine accident.

However, through the courtesy of the American-Hawaiian Steamship Co., owners of many steamers, the writer is enabled to accomplish the difficulty by giving some really authentic comparisons between two of their vessels, and one of the nine Diesel ships owned by the Anglo-Saxon Petroleum company; thus, as these comparisons, with the exception of one assumption, are of actual ships in service and calling at American ports, owners can place implicit confidence in them when drawing their own conclusions from the results of the similes. The only drawback is that the steamers are cargo vessels and the motor ship is a tanker two years old. But this is a point that unfairly favors the steam-driven vessels so far as comparisoning is concerned, because there is a limit to the amount of cargo that the tanker can carry, hence she is unable to take full advantage of all the space gained, whereas the steamer can when carrying light, bulky freight, such as cotton. In all three cases the ships are twin-screw, and the Diesel boat is one of four sister ships.

The general dimensions of these ships afford most interesting similes, and can bear dissecting, because it reveals that under present high freight conditions the motor ship's fuel economy is quite dwarfed when her enormously greater earning capacity is taken into consideration.

Hitherto, the fuel economy has been regarded by many as the most favorable property of the Diesel-driven vessel.

When burning coal, the two steamers carry 881 tons in their bunkers and have a cruising radius of 5,500 miles; so that to make a non-stop voyage of almost around the world (which the motor-ship could do) the coal burning vessel would require about 3,600 tons of coal in her bunkers, and the oil-fired ship would have to carry round about 2,500 tons of oil fuel, compared with 692 tons for the Diesel-engined craft. (The Diesel ship sailed for Calcutta from New York on June 19th with 4,460 tons of oil cargo and 450 tons of oil fuel in her bunkers.)

As it is unlikely that a steamship will be called upon to do this, we can dismiss the matter without further comment, except to point out it means that the motorship can take aboard fuel in whatever port the oil is cheapest, and it will suffice for several long voyages.

Reference to the above figures reveals the striking fact that for a deadweight-capacity of 210 additional tons the steamer had to be a little over 26 ft. longer over all and 2 ft. 10½ inches more draught than the Diesel ship, hence is a much more expensive ship to build, which means that her annual depreciation, insurance charges, dues, etc., are very much higher. Even had the ships been of exactly the same deadweight capacity, the motorship would easily be the smaller and cheaper to construct of the two, and being smaller would take less power to drive: In this case there is a displacement difference of 1320 tons. On the other hand had the ships to be of the same loaded displacement, the motor vessel would be able to carry at least 800 tons more cargo at the same speed, but with a fuel bill of one-third to one-fourth of the oil-fired steamer, and with approximately the same initial cost.

Surely the carrying of additional cargo, to the extent of 800 to 1000 tons, a distance of over 14,000 miles, and at one-fourth of the operating cost, must mean much to the ship owner, particularly if the overhead costs are the same. Let us work it out!

On the Italian service today it would mean about $35,000 extra for freight for one outward voyage alone, or say $52,500 for one return voyage if loaded at half-rate on the journey home. As there is a difference in the oil fuel consumption of 23½ tons per 24-hour day, this means, with oil at $2.00 per 42-gal. barrel, that the fuel bill of the steamer will be $306 more per day than the fuel bill of the steamer, or $6,426 for a three week's voyage. Taking seven return voyages per year, there is a fuel saving with the Diesel motorship of $89,864.00 per annum. This, with the extra freight carried in one year, would mean a grand total of $456,364.00 gain and saving. This is our one assumption. The freight rate quoted is, of course, abnormal, but actually paid by the writer on a recent shipment of steel to Naples. When the rates are reduced the saving will be in proportion.

Next there are the engine-room crews to compare, and it will be seen that this point evens itself out.

	Oil Fired	Diesel	Coal Burning
Chief Engineer	1	1	1
1st Assistant Engineer	1	1	1
2nd Assistant Engineer	1	1	1
3rd Assistant Engineer	1	1	1
4th Assistant Engineer	0	1	0
Deck	1	1	1
Oilers	6	5	6
Firemen	3	0	6
Wipers	3	3	3
Total	17	14	20

Now while there is a saving of men with the motorship, good marine Diesel engineers are harder to secure, and so can demand better wages, but the owner dispenses with that unruly class, viz: firemen, hence the engine room staff question is as broad as it is long.

But, in due fairness it must be pointed out that with steamers of this size the general practice is to have a single-screw, in which case there would be three men less.

As regards machinery space, the boilers and engines take up 54x46 feet in the best part of the ship, namely amidships; whereas the Diesel engines, having only 25½ ft. long, do not require more than 40 ft. at the stern of the ship (the position is optional), and the weight is considerably less, but the revolutions are higher, being 115 R. P. M. Flexibility of course is better with steam; but as the Diesel engines can turn down to under 40 R. P. M. this is sufficient for all practical purposes, as the propellers are smaller, hence less efficient than the large propellers of the steamers if turning at the same revolutions.

Manoeuvering depends much upon the smartness of the engineers. Usually, however, the Diesel answers quicker to the telegraph than do steam engines, the compression in the cylinders pulling the speed up quickly. From ahead to astern takes five seconds, and to start from "standby" about three to eight seconds. To start from cold from 8 to 15 seconds after the engineers have opened up the air connections. The time taken by steam engines to manoeuver are so well known that they need not be repeated here. Governing is better with the Diesel engine because the fuel immediately can be shut off, whereas the steam in the intermediate chambers of the steam engine prevents such rapid action. Also the smaller propeller does not come out of the water so often.

Repairs, of course, in the past have been much higher with Diesel ships if taken as a whole; but there are different types of Diesel engines, just as there are turbines and reciprocating engines, and in certain cases the repairs of Diesel engines have been very minor. In fact, the position today is much different from 18 to 24 months ago, so rapid has been the development. I was aboard the M. S. "Selene" a short time ago and the engineer in charge assured me that during the two years the ship had been at sea not a single cylinder or cylinder head had cracked, and were the same castings as originally fitted. Although she had only come in port from Europe two days previously, and was leaving for London the next day, not a man was at work in the engine room during my visit, which is different to the extraordinary reports one hears at times, of countless new cylinders, pistons, etc.

COMPARATIVE TABLE STEAMER AND MOTORSHIP.

Dimensions.	Oil Fired Ship	Diesel Ship
Actual Cargo Capacity	—— tons	4,560 tons in winter (5110 tons in summer)
D. W. Capacity	5260 tons	5050 tons
Length O. A.	370½ feet	344⅓ feet
Beam	46 feet	46 feet
Loaded Draught	24 feet 10½ inches	22 feet
Displacement (loaded)	9040 tons	7720 tons
Gross Tonnage	4408 tons	3778 tons
Net Tonnage	2824 tons	2274 tons
Indic. H. P.	2350 H. P.	2250 (equivalent to 2060 steam I. H. P.
Shaft H. P.		1650
Loaded Sea Speed	11 knots	10¼ knots
Light Sea Speed	12 knots	11 knots
Trial Speed		11¼ knots
Fuel Consump. per day, loaded	*30½ tons (long)	7 tons (long)
Fuel Consump. per day, light	27¼ tons (long)	6¼ tons (long)
Lub. Oil Consump. per I. H. P. under worst conditions		0.01 lbs.
Fuel Tank Capacity	1,500 tons	692 tons
Cruising Radius	14,175 miles	22,800 miles

* 195 barrels.

LUMBER CARRIERS TO HAVE BOLINDERS ENGINES.

The new lumber carrier which the E. K. Wood Lumber company, of San Francisco, is having built at Hoquiam is to be powered with twin 320-h. p. Bolinders engines. The vessel is to be 175 ft. long, about 45 ft. beam and will have a draft of 15 ft. The entire space below deck will be for lumber, and with a deckload she is expected to carry about 1,250,000 ft. of lumber.

FISCHER MADE OFFICER OF GAS ENGINE ASSOCIATION.

O. H. Fischer, president of the Union Gas Engine company, returned to San Francisco early in July from an Eastern trip, during which he attended the convention of the National Gas Engine Association and was elected first vice-president and member of the executive committee of the organization.

MOTOR LUMBER CARRIER BUILDING.

The C. & O. Lumber company, which has a large plant at Brookings, Ore., and office in San Francisco, is having a 175-ft. lumber carrier built by the McCormick yard at St. Helens, Ore. She is designed to be quite a speedy vessel, and will be powered with a pair of twin 320-h. p. Bolinders engines.

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OPERATIONS UNDER B. C. SUBSIDY ACT.

In discussing with a representative of Motorship the progress now being made under the British Columbia Shipping Aid Bill, the Hon. Michael Manson, M. P., of Victoria and Comox, said while in Seattle recently, that in his opinion the provisions of the act were broad enough to permit the government's rendering assistance to a company engaged in the manufacture of heavy oil engines.

In effect Mr. Manson said: "All of the vessels which are at present being billed under the terms of the new act are auxiliary motor vessels and it appears that as this type seems to prevail and since oil engines will be necessary to the construction of such vessels that the government might co-operate with some responsible parties who were willing to provide such a plant.

"Section 54 of the Act provides that the Shipping Commission may with the 'Sanction and approval of the Lieutenant Governor in Council by order in council contract with any person or company for the establishment of one or more shipbuilding, repairing or docking plants in the Province of British Columbia or any branch of such plant upon such terms and conditions as may be thought fit, and particularly upon the conditions that in respect of such shipbuilding plant securities may be issued by such person or company up to an amount not exceeding fifty-five per cent of the cost of such shipbuilding plant as certified by the Commission and the due payment of all such securities both as to principal and interest not exceeding six per cent per annum * * * shall be unconditionally guaranteed by the Crown in the right of the Province of British Columbia.'

"It is quite possible should a necessity be proven that this provision might be so construed as to make it possible to aid oil engine manufacturing in British Columbia, possibly under some British licenses for engines of this character.

"There are now building under the act seven vessels, four at Vancouver by the Vancouver Shipyard for Brown, Wolvin and Norcross, and three at Victoria by the Genoa Bay Lumber Company t a yard located on Indian reservation leased by he government. Two more vessels are contemlated for construction at New Westminster where ertain parties are seeking additional concessions rom the city but no definite action has been aken yet. The organizers of a company at Port loody are now negotiating with the commission ith regard to the establishment of a yard there ith a drydock capable of handling 25,000-ton vesels and general repairing and shipbuilding facilies."

The shipping commission has not yet been appointed and affairs are for the present being andled by the Lieutenant Governor.

TRIAL TRIP OF CITY OF PORTLAND.

The City of Portland was given a trial trip on he Columbia river on the seventeenth of July nd after a run of about 40 miles up and down he river returned to St. Helens for her finishing ouches. On the run against the river and tide he made an average of five miles per hour and ith the river current she averaged a little etter than ten miles.

During the trial the vessel had 350,000 feet of umber in her hold and 1036 barrels of fuel oil. When light she drew 11 feet 5 inches forward nd 14 feet 2 inches aft. After the fuel oil had een taken on she drew 10 feet 7 inches forward nd 13 feet aft.

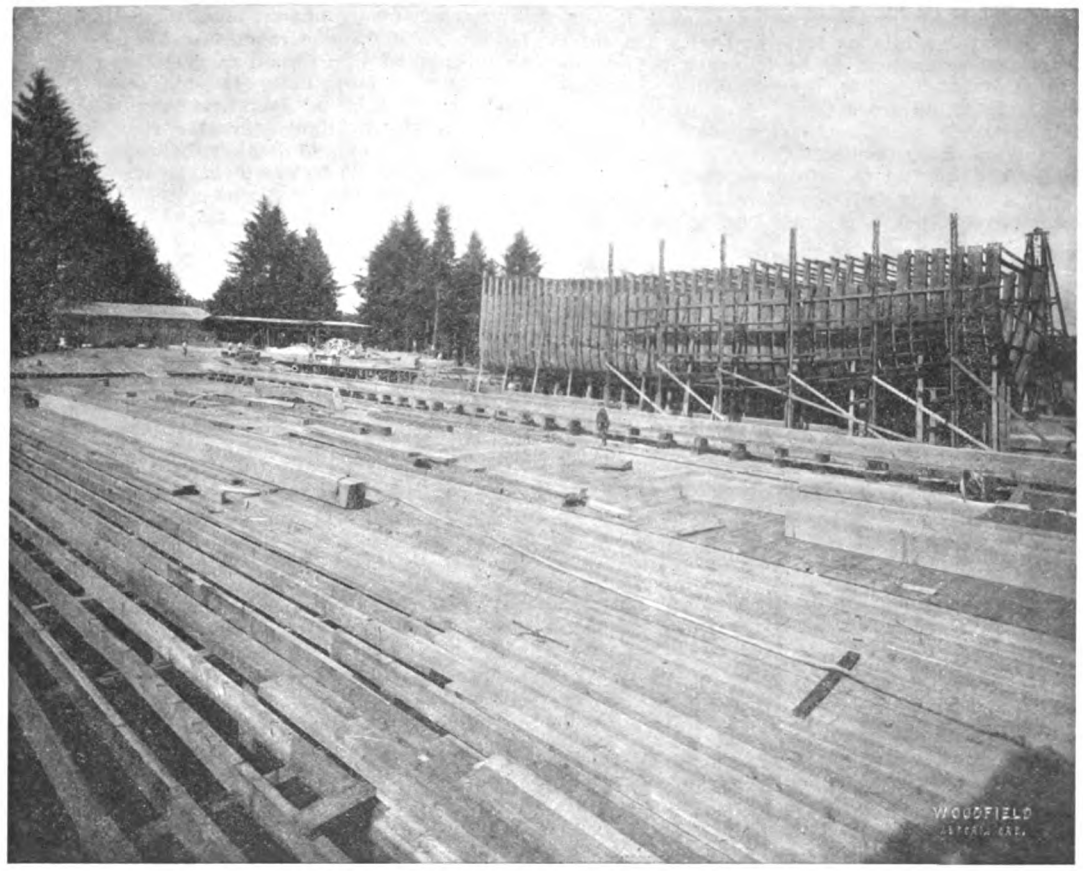
During the trial the engines ran with utmost moothness and every way acted to the satisfacon of both the owners and the agents of the olinder engines. The City of Portland is the rst of four motorships being built at St. Helens or the Chas. R. McCormick company and, as she s the pioneer of the fleet of motorships building n this coast, her performance will be watched y all the builders.

MOTORSHIPS FOR SALMON TRADE.

Libby, McNeil & Libby are considering the onstruction of two motorships to be used in the annery trade. They have recently acquired the orth Alaska Salmon company's four canneries nd vessels and feel that it would be a paying inestment to have at least two power vessels for he carrying trade.

The company is getting estimates on ships 220 eet long and about 40 feet beam and has also sked for prices on engines and equipment. Conruction and equipment prices have been forwardd to the head office in Chicago and, while it is enerally believed that the company intends to egin building at an early date, nothing definite as been given out.

Five Motorships Under Way



McECHRAN, STANDIFAR, CLARKSON YARD AT ASTORIA

The firm of McEchran & Co. has been reorganized and is now known as the McEchran, Standifar, Clarkson Ship company. Mr. Standifar is a railroad contractor, with headquarters in Portland, and Mr. Clarkson, also of Portland, is a lumberman. They are pushing the work in their Astoria shipyard and now have five ways with keels laid on them. Supt Clark is getting out his ships as fast as men and his wonderfully organized plant permit. The yard is laid out to the natural slope of the ground and the logs are unloaded at the mill on the uphill side and almost by gravity continue toward the river where the finished ship is the product.

This company is about to begin work on two more motorships designed by the Skandia Engineering company of Seattle. These new ships will be 266 feet long, 43 feet beam and 22 feet deep. They are four masted schooner rig and powered with two 320 h. p. Skandia heavy oil engines. They will have complete electric equipment, electric winch at each hatch, electric anchor hoist, capstan, lights, etc.

The hull has been designed to give it stiffness under the heavy load of 900,000 feet of lumber in the hold and 950,000 feet as deck load. Besides the five-inch decking the deck will be further stiffened by the addition of an 18x32-inch stiffener running the full length of the ship on each side of the hatches. The hatch coamings will be built on top of these stiffners which will give the hatches more freeboard in rough weather. This type of construction has been used on steam schooners with success.

The main keel will be a 20x24-inch beam and on top of this will be worked seven 20x22-inch keelsons. The deck beams will be 15x15 inches square and a hold beam will be put under every deck beam. Twelve by twelve inch stanchions will be worked under every full deck beam and the deck beams will be stayed to the ceiling with cast steel knees. Twelve inch ceiling will be used with a 12x15-inch bilge keel and the planking will be five and a half inches thick.

Seven hundred and fifty barrels of oil will be carried in four tanks. Two of these will be located in the forecastle and one on each side of the engine room. The large tanks in the engine room are built to fit into the bilge and up under the beams and in this way they are easily blocked in and made entirely safe from breaking loose in any kind of weather. The framing under the engines is solid and the engine foundation is of solid fir construction with an iron bark seating for the engine.

The usual provision for the crew is made in the forecastle while the officers and chart house are located in the poop. These schooners have been registered with the American Bureau of Shipping and given a rating of A1 for fifteen years.

The Skandia Engineering company have gotten out some interesting figures based on the type of schooner which they designed for McEchran & Co. and on the rate at which charters are at present. They estimate the cost of their 250-foot schooner, which will carry 1,500,000 feet of lumber, at $180,000. Mr. McEchran believes that with the yard in good working order these ships can be turned out for between $150,000 and $160,000.

The gross earnings for one trip for this ship would be:

1,500,000 feet of lumber, Puget Sound to Sidney		$ 46,500
2,500 tons coal, Newcastle to Callao		30,000
2,500 tons nitrate, Antofagasta to Puget Sound		37,500
		$114,000
Wages, Per Month.		
Captain	$165.00	
1st Mate	90.00	
2nd Mate	80.00	
Chief Engineer	135.00	
1st Assistant Engineer	100.00	
2nd Assistant Engineer	85.00	
Steward	75.00	
Boy	30.00	
5 Sailors, $40.00	200.00	
	$960.00	
For 4½ months		$4,320.00
Operating Expenses, One Month.		
Fuel for 30 days at $1.25 per bbl.	$ 675.00	
Food at 60c per man	234.00	
Lubricating and engine room supplies	75.00	
Insurance 7%	1,050.00	
Depreciation 5%	750.00	
Upkeep	200.00	
Taxes, ½ of 1%	75.00	
Liability 1½%	225.00	
	$3,284	
For 4½ months		$14,788.00
Terminal Expenses—Stevedoring.		
Lumber, loading $1.00 per M.	$1,500.00	
Lumber, discharging $1.00 per M.	1,500.00	
Coal, loading 30c	750.00	
Coal, discharging 45c	1,125.00	
Nitrate, loading 50c	1,250.00	
Nitrate, discharging 80c	2,000.00	
		$8,125.00
Total expenditures		$27,223.00
Net earnings for trip of 135 days		$86,777.00

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SHIPBUILDING BOOM IN UNITED STATES.

During the first half of 1916 the shipyards of the United States launched and put into operation 192 ships of 228,016 gross tons, or more than the entire output for 1914 or 1915, and with 159 ships of 444,090 gross tons to be launched before December 31st the total for the year will be 351 steel ships of 672,106 gross tons. According to these figures which were compiled by the Bureau of Navigation, Department of Commerce, the United States, for the first time in more than half a century, is not only building more ships than any other country, but is probably building more than all of the rest of the world.

In 1913 the belligerent powers turned out 2,798,580 gross tons of merchant ships, but in 1915 their output fell to 769,875 gross tons and at the present time their yards are either occupied with naval work, or their machines are turned to the production of ammunition. There are building in the yards of the United Kingdom 423 steel steamships of 1,423,335 gross tons, but dates of launching and delivery are uncertain under present conditions. There is also considerable tonnage in France partly built. In Germany and Austra-Hungary merchant work has stopped altogether.

In the neutral countries outside of the United States there are at present building 104 steel steamships of 464,370 gross tons in the Japanese yards and 71 of 251,750 gross tons in the Netherlands. The output in Norway in 1915 was 85,000 tons and this doubtless will be exceeded in 1916.

Compared with the output of 1913 the decline in the world's shipping since the beginning of the war has been 3,500,000 gross tons which is about 300,000 gross tons more than has been destroyed. All of the yards in the neutral countries are ordered ahead as far as 1918 and the Japanese yards have had to turn down orders from outside their own country to supply their own ship owners. Japan is obliged to import steel and this has extended considerably the market for American steel products.

MOTORSHIPS FOR NEWFOUNDLAND.

A scheme has been introduced to foster the fisheries of Newfoundland and the neighboring waters, and from the details to hand it appears that this proposition is likely to assume important dimensions, and that its fulfilment will not be seriously delayed even by the war. The first order, says "Lloyd's List," has already been placed, and a 160-ft. motor vessel is being built at the yards of Messrs. J and G. Forbes of Sandhaven, the ship having been designed by Mr. J. A. M'Callum, of Glasgow. She is to be of composite construction.

The two engines to be installed are of the two-cycle Polar type, each developing about 350 b. h. p., and giving the vessel a speed of over 13 knots.

In spite of constructional difficulties, it is anticipated that the vessel will be completed in about four months, and it is worth noting that for building vessels of this class labor is still available in Scotland.

It is probable that contracts will soon be arranged for more craft of a somewhat similar type, but in which higher-powered motors will be installed, developing about 1000 h. p. in all and giving a speed in the neighborhood of 15 knots. In view of the necessity of bringing the fish to its destination in this country as rapidly as possible, it is evident that every additional knot is of importance.

The undertaking has received the practical support of the authorities in Newfoundland, who are taking the keenest possible interest in it, as they realize that if it is successful it will lead to much larger developments in the course of the next few years.

The control is in the hands of those who know intimately the waters to be fished and are confident that there are enormous untouched fishing grounds.

It may be asked why a similar scheme has not previously been worked out, utilizing steam ships instead of motor vessels, and the reason is interesting.

It has not been found feasible to build a thoroughly suitable steam-driven craft with sufficient speed to transport the fish rapidly to England, owing to the large bunker space required for the coal. With a motor ship this difficulty does not arise.

THE OIL-ENGINED SHIP HERA

Considerable interest has been taken in the exploits of the oil tank vessel Hera, which is fitted with two Kromhout 275 b. h. p. engines (Messrs. Perman & Co., Ltd., London). The twin-screw steamer Hera is owned by the Nederlandsch Indische Tankstoomboot, Maatschappij, of The Hague, Holland. She represents the last word in an oil-engined ship for oil carrying, and will carry 450 tons of oil in bulk. In addition to the main engines, an 8 h. p. Kromhout auxiliary engine drives an electric light generator and an air compressor. An oil-fired donkey boiler is fitted to supply steam to deck winches, cargo discharge pump and radiators in cabins.

MOTOR TUG OF UNUSUALLY HEAVY CONSTRUCTION.

One of the strongest motor tugs ever built on this coast is now nearly ready for launching at the yards of the James W. Evans Shipbuilding company, at Terminal Island, Cal. The craft is 62 feet 1 inch over all, 15 feet breadth, having a draught of 8 feet 7 inches, the freeboard at the bow being 6 feet, 3 feet at the stern, the least freeboard being 2 feet. The frame is of the best quality Oregon pine, thoroughly and naturally seasoned. The ribs are 3¾ inch moulded 5 inches at heads and 8 inches at heels, set in pairs 4 inches apart. The keel, keelson and bilge stringers are all of one length, there being no scarfs and no butts, giving the maximum of strength. The arch knees are sound pine crooks. The keel will be shod with 1½ inch iron bark, in one piece. The planking is of 1¾ inch pine S. 4 S., not to be sprung, except on top sides.

Taken as a whole it is said that this construction makes the vessel more than twenty-five per cent stronger than the ordinary tug of this type. The tug was designed by C. D. Callahan, naval architect, at San Pedro, Chas. W. Cookson being the superintendent of construction.

The engine will be three-cylinder Union of 135 horse power. The name of the vessel has not as yet been selected.

The tug will be used for towing the barges of the General Petroleum company, which has a pipe line leading from the Maricopa field to Los Angeles Harbor, a distance of 154 miles, and a storage reservoir on top of the hill at Point Fermin, with a capacity of 500,000 barrels. The tug and barges will be used principally to supply vessels with fuel oil while they are discharging cargo at their respective wharves in various parts of the harbor.

J. W. Evans, of the firm building this vessel, states that many prospective builders have been halted in their plans by the strike of the longshoremen of the Pacific Coast, but that as soon as that is adjusted many orders will be placed for boats of various types.

TRADING SCHOONER BEING FITTED WITH OIL MOTORS.

Some further changes of ownership have been reported of the three masted schooner Hugh Hogan, which has been well known in the coast lumber trade for many years; and just who owns her at present would be hard to find out. This has not prevented work from being carried out on her at Frank Stone's yard in Oakland, where she has been lying for several months, and she has been almost rebuilt inside, fitted for general cargo and passengers, and will be equipped with engines. The Hogan is 175 ft. long and 40 ft. wide, drawing some 10 ft. of water. The principal change in construction is the building of a new raised deck, giving her a large 'tween-decks space, which will be used largely as a steerage, having accommodations for many passengers. A larger cabin has also been built astern, with convenient officers' quarters and a number of staterooms for first class passengers. The power equipment will consist of a pair of twin 160-h. p. Bolinder Diesel engines.

MOTORSHIP BEING TOWED BACK TO PORT.

The motorship "Kuskokwim River" of the Westward Navigation company met with hard luck near Chignik, Alaska, and lost all of the blades from one wheel and two of the three blades from her other wheel. The vessel put into Chignik and laid there until the company was notified and a tug sent to tow her to Bothel on the Kuskokwim river, where her cargo was discharged.

She is now on her way south in tow of the tug Columbia, of the North Coast Towboat company, and as soon as she arrives new propellers will be fitted. The Westward Navigation company plans to have their boat make at least one more trip up the river this year.

MOTORSHIP CONSTRUCTION NOTES.

Heavy weather and material shortages have been delaying the progress of wooden ship construction in the Northwest for the past month. The rapid rise of the Columbia river stopped all work on the new yard of the Motorship Construction company of Vancouver and nothing will be done there until after the river gets back to its normal level.

At St. Helens, Ore., the shipyards of the Chas. McCormick company are under several feet of water and immediate work on the hulls is stopped. Material is being worked up in the shops and everything done to rush the construction as soon as high water is past. The same thing has delayed the Knapp interests of Portland, who are about to start work on their yard on the Willamette between Portland and St. Johns.

On the East waterway in Seattle, rain has delayed work on the first of the Alaska Navigation company's boats. Framing is about completed on this motorship, the keelsons are being fitted and ceiling and planking will be started at once.

Across the East waterway the yard of the Washington Shipping corporation has been delayed by shortage of material. The first hull is about three-quarters framed and the keelsons are being worked up and fitted. Work on the second hull has been practically at a standstill, but material is beginning to come in again and construction will be rushed. Mr. Sloan, who is in charge of the construction, figures he is about twenty-five days behind on the first boat and thirty days behind on the second. He is working more than a hundred men and everything possible will be done to make up for the delay.

The Grays Harbor Shipbuilding company is rushing work on the first two of the three vessels they have planned. One of them is all framed up and is being ceiled and the frames of the second one is practically finished. The Ward Bros. are working 125 men in this plant.

Work at the yard of the Ballard Marine Railway company has been held up for the past month by the fill which is being put in above the Salmon bay locks in connection with the Lake Washington canal. The bay at Ballard will be raised to the same level as Lake Union and the plants and docks there will have the advantage of being in fresh water far from the destructive teredo.

The Marine Railway company has been putting in two new marine railways, one to take vessels up to 600 tons and the other up to 400 tons. They expect the dredger to be through working by the first of August, when they will be in a position to resume work with deep water in front of their plant and no tide—two advantages they have not enjoyed heretofore.

They have had plans drawn for a 700-ton floating drydock on which they expect to begin work some time in September. The new dock will be 300 feet long by 100 feet wide and will be electrically operated. More than $7,000 has already been spent on improvements, and the manager, C. A. Fryberg, intends to be in a position to handle the increase in business which he expects to come with the completion of the canal.

The Electric Boat company reports the work on the three submarines which they are building at the yard of the Seattle Construction & Drydock company is about 90% completed and that they will be launched some time in September. The company also has supervision of the work on the submarine that is to be built at the navy yard in Bremerton, on which construction is about to start.

Barbare Bros.' yard in Tacoma is still busy on their schooner which they have sold to O. A. Anderson. Framing and ceiling have been completed and the work of putting down the deck and fitting the planking is well under way.

WORLD'S LARGEST MOTORSHIP SAILS FOR PACIFIC COAST.

What is said to be the largest and fastest motorship in the world, the Chile, represented in San Francisco by the East Asiatic Steamship company, left Norway for this port July 7, and is expected at San Francisco about the middle of August. The Chile has a dead weight capacity of 10,500 tons. She is bringing a general cargo of European merchandise, and on arrival will load for the Orient.

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Seattle Shipbuilding Concern Reorganized

WILLIAM H. TODD, President
Seattle Construction & Drydock Co.

C. W. WILEY, General Manager
Seattle Construction & Drydock Co.

Control of the Seattle Construction and Drydock Company was taken over by the Todd Shipyards Corporation of New York July 25th and the new company proceeded at once with the reorganization and plans for enlarging of the Seattle plant. J. V. Patterson, general manager since the yard was purchased from Moran Brothers Company in 1905 and became the Moran Company, and later the Seattle Construction & Dry Dock Company, resigned and his place was taken by Clarence W. Wiley.

William H. Todd of New York is president of the new company; C. W. Wiley, vice-president and general manager, and Harry W. Kent, secretary and treasurer. The other members of the board of directors are H. F. Alexander, president of the Pacific Alaska Navigation Co.; W. H. Bogle and F. T. Merritt of the firm of Bogle, Graves, Merritt & Bogle, attorneys; E. C. Ward, vice-president of the Pacific Coast S. S. Co., all of Seattle; and R. F. Walcott of New York City.

The Todd Shipyards Corporation, into whose ownership the Seattle yard has passed, also controls the Robins Drydock & Repair Co., Erie Basin, Brooklyn, and the Tiejen & Lang Dry Dock Co., Hoboken, N. J. The property represented in this merger of shipbuilding and repair concerns aggregates in value $16,000,000.

The local yard will be enlarged and improved as fast as conditions warrant. A new floating drydock will be built at once to take care of the larger shipping that is coming into Seattle harbor. Two new building ways are under construction and more will be built if needed. The yard has all of the new work and repair work it can handle at present and more is in sight.

President Todd has come up to his present position from the ranks beginning his shipbuilding career as riveter boy with the Pusey & Jones shipbuilding plant at Wilmington, Del. Afterward he became master shipbuilder in the Brooklyn Navy Yard and about twenty years ago went with the Robins Dry Dock & Repair Company, of which plant he afterwards became superintendent and then president.

Clarence W. Wiley came to this Coast from Boston about 1900 as marine superintendent of the Boston Steamship Company and the Boston Towboat Company. He was a graduate of the Massachusetts Institute of Technology and had been in the office of these companies in Boston. At that time the Boston Steamship Company was operating the steamships Shawmut and Tremont, which were afterwards sold to the Isthmian Canal Commission for the run between New York and the Panama Canal. They also operated the Lyra, the Hyades and the Pleiades in their business between Seattle and the Orient.

In 1908 he helped to organize the Crosby Towboat Company, and among his other duties served as its president for a number of years. In 1908 he severed his connections with the Boston Steamship Company, but continued to act as agent for the Crosby Towboat Company until 1911.

Continuing his success in the steamship line, Mr. Wiley became manager of the Alaska Pacific Steamship Company in 1913 and was with that company until he went to the Great Northern Pacific Company as marine superintendent, with offices in San Francisco, early in 1915. He has had experience with the steamship business from every angle and should be at his best in his new position. He is a competent and clever engineer and architect and a very capable operating man. As general manager of a large shipyard he is in his logical position and his success is expected by the men in the shipping circles by whom he is very highly thought of.

MOTORSHIP VS. STEAMSHIP.

When the good and bad qualities of the motorship and the steamship are balanced, says C. Kloos, the technical director of Werkspoor, Amsterdam, in the London "Shipbuilder," the fuel price in those parts of the world where the ship is to be run will generally decide to which side the balance will incline. In special cases, however, the fuel price will not be the main factor to be considered, for the following properties of the motorship may be of greater value: (a) It does not require any warming up of boilers or engines, and may be started at full speed as soon as the oil tanks are filled; (b) It is only necessary for a motorship to bunker at very long intervals, say, three or four times longer than a steamship; (c) Motorships can be constructed so that the part of the ship where the engines are placed will be of the same temperature as the other parts of the ship, a consideration that will go far to turn the balance when the engineers have a say in the decision.

"CRAIG" DIESEL SUBMARINE ENGINES.

The U. S. Navy Department has approved "Craig" Diesel engines for submarine service and has awarded a contract to the Craig Engine & Machine Works within the past few days for the installation of its engines in submarines about to be built. The "Craig" design of engine was also used in the submarines previous to the introduction of Diesel engines.

The Union Gas Engine Company of San Francisco are Pacific Coast agents for "Craig" Diesel engines.

REPORT ON MAIDEN VOYAGE OF CARACAS.

Reports have recently come in from the brig Caracas, which is equipped with two 160-h. p. Bolinder engines. During a voyage of 27 days 22 hours her starboard engine worked 491½ hours and her port engine worked 570 hours. During that time the engines used 28 tons of fuel oil, 450 litres of cylinder oil and 650 litres of bearing oil. On her second trip the engines ran 350 hours and 339½ hours respectively and consumed 15 tons of fuel oil, 150 litres of cylinder oil and 350 litres of bearing oil.

The Caracas is 218 feet long, 33 feet 6 inches beam, 16 feet draft, 18 feet 3 inches deep and 1500 tons dead weight. By use of her engines alone she obtained a speed of 8 knots when fully loaded and nine knots when in ballast. When sailing the motors were found to be a good help, especially when beating up against the wind.

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The Gasoline Question

Much has been written lately in a hysterical way, and much ranting has been done in legislatures and in the halls of Congress on the subject of gasoline and its sudden rise to what seems to be considered by the consuming public an iniquitous price. Succinctly, the public wants to know if the rise is warranted; is it due to that industrial Machiavelli, Standard Oil. Parenthetically it may be asked, is the present level of prices, in view of conditions, at all abnormal?

Be the answer what it may, the public's interest lies largely in what can reasonably be expected in the future in regard to both supply and price for what has become a most important staple of commerce. The public asks the professional man on the one hand, what avenue of relief is there for this new situation, and on the other hand requests the attorney-general to state what, if the cards are stacked by the aforeascribed machiavellian trust, is he going to do about it?

The question has had the dignity of a resolution passed by the U. S. Senate, where, unfortunately, political fences are sometimes built in anticipation of coming elections, and has for months occupied the attention of the Federal Trades Commission. In reply to the Senate resolution our well-informed secretary of the interior reported to Congress clearly, at length, and to the point that it is only a natural situation, while the newly-created trades commission has rendered thereon a preliminary though somewhat non-committal report. The following data, observations and impressions are taken mainly from these reports, and from the U. S. census, as well as from published interviews with prominent factors in the oil business—the producers and refiners themselves.

In the ordinary course we look for guidance to general principles. The law of supply and demand is one of these, and has been generally accepted as ruling in every-day affairs. There is no reason why it should not apply in this case, barring special conditions that obtain in every particular industry.

The most potent and obvious fact in the situation is that the consumption of gasoline will continue to expand in direct ratio with the expansion of the uses of the internal-combustion engine, particularly the automobile, the auto truck and tractor, and the motor boat. There is some hope of finding limited substitutes for gasoline as fuel for internal-combustion engines, but these substitutes will most likely also be petroleum derivatives rather than of non-petroleum origin, such as alcohol. If the demand for gasoline or its equivalent continues to expand at its present rate, and if the supply of the raw product, its parent, is fixed within certain limits, there can be but one solution of the problem of how to meet the coming demand, and that is to increase the yield of the desired product from the crude oil stock, or to increase the amount of oil that is consumed for refining by reducing the quantity consumed directly as fuel, which would be only a qualified relief under present conditions.

The expression "present conditions" is used advisedly, for but 15% of the crude oil yield last year was made into gasoline, representing probably the maximum obtainable under current refinery methods, or the present state of the art. In other words, if there is to be an increase in the supply of gasoline it must come through improved methods of refining. With the above outline of the problem there are offered the following thoughts upon some of its possible solutions.

It was vaguely known in the chemistry of petroleum for more than fifty years that under certain conditions crude oil could be "cracked" and made to yield a higher percentage of the more volatile products. To apply a process therefor and make available commercially a principle—if such could be done—was the mark set by many inventors and some few actual experimenters. "Cracking," in its simple analysis, means breaking up or disassociating by heat and pressure the molecules of the heavier hydrocarbons of crude oil and reforming them into molecules of the lighter elements. The first important commercial advancement in this direction was gained in 1913 in a process brought out by W. M. Burton (U. S. Patent 1,049,667), wherein the distillates, or the secondary light products of the ordinary refinery, could be re-run in a still having the form of the common still, but working under about 75 pounds pressure. By this method the increase in yield of gasoline is pronounced. The process was at once taken up by the Standard Oil Co. of Indiana, and it is reported that 3,000,000 barrels of gasoline was made with it last year; truly an encouraging advancement. But it was reserved for the year 1915 to produce what promises to be a greater achievement—that of Rittman. The eyes of five million users of internal-combustion engines are fixed upon it, asking whether this is a real star to which they can hitch their wagon, the allied petroleum products industries are scanning its possibilities, and the scientific world awaits confirmation of an indicated revolutionary discovery, proved by the commercial application of the new principle.

Briefly, what Rittman has done is to devise a practical method of applying the "cracking" principle to its logical purpose; his method indicates the ability to convert any crude oil of whatever base (asphalt or paraffine, or mixed) or any product or any residue from such oils from present refineries, into but three products:

1. Fixed gases, which can be used in the reduction process itself.

2. Fixed carbon in the form of coke, lampblack, etc., which always have a good market value and a market not easily surfeited.

3. An oil, all of which can be made by repeated distillations into gasoline of any desired gravity, or by a different manipulation of the pressures and temperatures used, can be converted into the aromatic hydrocarbons, benzene, and toluene.

This discovery, preceded by years of elaborate experiments in the laboratory at Columbia University, in which the groundwork of the chemical principles involved was thoroughly worked out, has been demonstrated on a commercial scale with full-sized plants. What Rittman apparently has done is to go a step in advance of Burton, who had already achieved success, but upon radically different lines. Burton dealt with distillates, or intermediate products only, and with moderate pressures (75 lb.) with combined liquids and vapors. Working on the knowledge that chemical control was more easily obtained when dealing with vapors than with liquids, Rittman at once converted all his oil into vapor, and by adopting a vertical tube of relatively small diameter for the working appliance to permit of using high pressures and better heat control, in place of the large horizontal still of ordinary form, there was thus given him, ipso facto, the medium for some radically different and improved results. This is proved by the fact that from the same apparatus there can be obtained, by different manipulation and by varying the conditions of heat and pressure, either the aromatic hydrocarbons, benzene, and toluene, used respectively in the dye and the explosives industries, or the sweet hydrocarbons such as gasoline. It is too early to predict the ultimate effect a wide adoption of the process will have upon the ramified markets of crude oil and its products. If it proves a commercial success—in all that the term implies—the volume of production possible from new Rittman plants can hardly influence the gasoline market for two years to come, for it takes time to build plants and to do the necessary experimentation with individual oils. If the Rittman process does not prove successful on large scale operations, there does not appear in sight much other relief in the way of improved processes to extract a higher yield of gasoline from crude oil. Considering the fact that economists place so high a value on our reserves of crude oil as to maintain that their primary use should be limited for purposes and uses for which there are no substitutes in nature—as for instance, lubricants and refined derivatives—there must be a profound readjustment of the bases of things pertaining to oil in the next five years, if not sooner. For one thing, the burning of it under boilers in unrefined state to generate steam must stop.

If the agitation over the price of gasoline yields no greater practical result than to call attention to the effect of supply and demand upon the raw product—crude oil—and to the status of the refining art, it will have served a good purpose. If it will also bring out some fundamental facts about the oil business, as for instance (a) that its pursuit should occupy only those equipped with experience and highly efficient organization, (b) that the business is one requiring enormous amounts of capital, especially liquid capital that must be available on a moment's notice to throw into any new situation such as is created by the "bringing in" of a new oil field, like Cushing, or the discovery of a new process that overnight will scrap the machinery of a plant covering 10 acres, (c) that the risks involved are more hazardous than any other form of mining operation (of which it can be considered a part), and mining is looked upon by the business world as involving the superlative of all business risks—if some of these fundamentals are brought out by the gasoline discussion, important light for guidance will be thrown upon many related questions. To substantiate or illustrate the point that enormous capital is required to engage in the oil business in a particular region we have only to turn to two particular ventures here in California in the past five years. One is the history of the General Petroleum company and the other that of the Shell company. It has been regarded as axiomatic that it required $25,000 worth of capital to "turn over" one barrel of oil per day, that is, to buy or produce one barrel per day, and transport, refine, market, and distribute the products therefrom. The records of these two enterprises are much to the point: one is of domestic origin and primarily represents the consolidation of prior local interests, having only local capital to finance its operations, and whose affairs are now in process of reorganization, while the other is a branch of the Royal Dutch-Shell combination operating in most of the world's oil fields and having unlimited capital on which to draw. Data are not available to fix the sum of the first company's investment, but the latter is reputed to have expended thus far $30,000,000 to handle 10,000 barrels per day production of the 250,000 barrels currently produced each day in California, and has not yet concluded the capital expenditures necessary to put itself in the position to compete at all points in the Pacific coast markets with the markets previously established.

In view of the above it would seem beside the question to rail against the undeniably large profits, as such, that lie in the oil business for those whom the public expects shall provide a gallon of gasoline at any hour of the day and every day in the year and at any consuming point on any continent. Acquired necessities impose obligations and for these obligations (and facilities) we must pay a good price whether or not we want to do so, so long as enormous sums, which the public does not provide, are required first to find at its own risk a commercial oil deposit, and then to produce, transport, refine and distribute the product. The point where artificially controlled conditions show nearest the surface is in the monopoly that goes with the pipe lines that transport the crude oil from the well to the refinery, yet, as these are but one link in a longer chain, a breach at that point can hardly affect the problem in its larger aspect. If a conspiracy does exist to boost and maintain prices of gasoline, then the Standard Oil, which, as reported, refines 60% of our gasoline, emerges in the preliminary report of the Federal Trades commission with the record of supplying the same, considering large averages over the whole of the country, at from ¼ to ½ cent under what the consumer pays the independent. Counting the experience, capital, and organization of the Standard, this is surprising mainly to those who lack familiarity with the subject. In saying this we hold no brief for Standard Oil, for the term is used to represent a type of operations rather than a specific business organization.—Western Engineering.

BARK DOCKS FOR ENGINE INSTALLATIONS.

The bark R. P. Rithet, of the Matson Navigation company, in the sugar carrying trade between San Francisco and the Hawaiian Islands, is now at the Union Iron Works, being equipped with a pair of twin 160-h. p. Bolinders engines. The installation is a duplicate of that in the Annie Johnson, belonging to the same company and of similar construction. The Rithet is a slightly larger vessel, being registered at about 2,000 tons. The Annie Johnson has been giving great satisfaction since her engines were installed.

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MOTORSHIP'S EASTERN REPRESENTATIVE APPOINTED.

The publisher of Motorship is pleased to announce that Thos. Orchard Lisle, A. M. I. Mar. E., the well-known internal combustion engine expert, has been appointed manager of the Eastern office of Motorship, now located in the South Ferry building, New York City. Mr. Lisle has for some years been a frequent contributor to American and English technical journals and is especially well known to those who have been following the evolution of the oil motor.

ANNOUNCEMENT.

It will be noted that this issue of Motorship while following the June issue is indicated as being the August number. Heretofore the number of Motorship issued on the twenty-fifth of the month has carried the name of the current month. As by the time Motorship reached a number of the distant points to which it circulates the first of the following month has practically arrived the Publisher has decided to adopt the practice of inscribing each number with the name of the following month, a common practice in the publishing world. This does not mean that any number of Motorship has been skipped or that any longer time has elapsed or will elapse between issues.

To subscribers who are unable to get copies of Motorship on the news-stands owing to the fact that copies have been exhausted, we would suggest that a check for $2.00 ($2.50 foreign) be sent for a year's subscription. We have doubled the number of copies of Motorship placed upon the news-stands each month but have always undercalculated the demand unfortunately for the many who are desirous of securing the information contained in this magazine.

?

On July 21 Pacific Coast papers generally published the following story:

> Work on seven auxiliary schooners for Hind, Rolph & Co., of San Francisco, will be started soon at a new shipyard to be erected on the Lewis and Clark River, three miles from Astoria, it was announced here today by H. B. Spear, president of the American Shipbuilding Company.
>
> Spear said the shipbuilding company has a capital stock of $1,500,000 and has already let contracts for the construction of the shipyard. Each of the schooners to be built for Hind, Rolph & Co. will cost $175,000 and have a capacity of 2,250,000 feet of lumber.

On July 22, Hind, Rolph & Co. wired Motorship as follows:

"No foundation for report nor do we contemplate doing so."

On July 26, Motorship received a wire from H. B. Spear at Portland, from which we quote the following:

"Did not give out that information."

Motorship cannot of course undertake to fix the responsibility for rumors of this sort, but we do not think that they are calculated to stimulate public confidence in the motorshipping industry.

A MESSAGE FOR AMERICANS.

We wish that we could place a copy of the "Heritage of Tyre" by William Brown Meloney*, in the hands of every land-locked citizen of the United States. Mr. Meloney has voiced the authentic message—"Above all a call must be sounded which will draw Americans back to the sea. And it must be the call of a special class. It is going to take time and bigness and patience * * * what we have been destroying through fifty years we cannot rebuild in an hour * * * The destiny of the United States is inseparable from the sea. We are committed to the use of the oceans which are our boundaries by all the factors in the scheme of civilization—committed geographically, politically, commercially, socially and by the military necessities and the instinct of self preservation. We can no longer deny this precious Heritage of Tyre and continue to survive as a power of influence in the affairs of the world."

* Macmillan, New York, 1916. 50c.

LAKE WASHINGTON ANCHORAGE.

An inquiry has reached this office asking for information as to whether there will be any restrictions imposed by the Federal Government on anchoring vessels in any part of Lakes Washington and Union where it may be desired to lay same up, as in the case of fishing vessels during the winter.

The matter was accordingly taken up with Colonel Cavanaugh in charge of the U. S. Engineers Office of the War Department at Seattle, and he has replied as follows:

"July 24, 1916.

"Mr. Miller Freeman, Publisher

"Seattle, Wash.

"Sir—Replying to your letter of July 18th, would say that one of the advantages of the Lake Washington Canal will be to permit vessels to remain in fresh water during the idle season, and no objection to anchorage in Lakes Union and Washington will be made, so long as the areas selected for this purpose are out of the lines of usual traffic.

"Should it be found desirable or necessary to designate specific areas to be occupied by vessels at anchor, the War Department will undoubtedly take the action necessary for setting aside these areas for this purpose as contemplated by law.

"(Signed) J. B. CAVANAUGH,

"Lieut.-Col., Corps of Engineers."

NEW MOTORSHIP COMPANY ORGANIZED.

The China-American Motorship Co., Inc., has been organized in San Francisco for the purpose of building and operating motor auxiliaries to and from the Orient. The new concern was incorporated by Melbourne Crisp, president and superintending engineer, and Lester McDonough, both of San Francisco, and Lewis A. Hewitt of Oakland. Captain W. G. Tibbitts acts as secretary of the concern which maintains offices at 611 Marvin Building.

Mr. Crisp, who resigned from the United States lighthouse service as assistant superintendent of construction in order to undertake this work is a marine engineer and naval constructor, and is said to have had a personal experience over a period of twenty years in the operation, construction and repair of floating property.

The company is frank in its announcement that stock will be sold broadcast in order to finance the building. The corporation is capitalized at $1,000,000 with a par valuation of one dollar per share. The prospectus, while it contains the usual amount of "patter" for the benefit of the inexperienced, seems, as far as the figures go, to be written along conservative lines.

The China-American Motorship Company has just received permission to sell 99,997 shares at par, $1 per share, to net the company not less than 80c per share. All the money received from the sale of these shares is to be placed in a depositary, and none of the subscriptions called until not less than 315,000 shares shall have been subscribed, so as to insure the construction of the first of the vessels planned. The company is allowed until February 1, 1917, to secure the necessary subscriptions, and no commissions will be paid prior to that time.

It is to be hoped for the sake of the motorship industry that no difficulty will be encountered in financing the concern as it is proposed to construct five five-mast vessels, 290x48 feet, with a 26-foot depth of hold and a carrying capacity of 4,000 tons or 3,500,000 feet of lumber. It is proposed to equip each vessel with two 400 h. p. Diesel engines.

It is proposed to operate with San Francisco as a headquarters on the Hongkong and Vladivostok runs. If plans materialize contract for the first vessel will be let within a few weeks construction upon the balance of the fleet being delayed until prices return to normal.

In writing to "Motorship," Mr. Crisp says:

"The proposed vessels for this company are large for wood construction, but I have taken every precaution to guard against any weakness installing extra heavy ceiling, edge bolting the outside planking and many other details necessary for strength in vessels of wood construction of the desired size. The vessels are to be 260 feet long from stem to stern on the main deck, or 290 feet over all, 48 feet moulded breadth and 26 feet depth of hold."

SAN FRANCISCO-HONGKONG STEAMSHIP COMPANY.

Another new corporation to engage in the motorship transportation business was recently organized under the name of the San Francisco-Hongkong Steamship Company, the intention being, as the name implies, to operate a fleet of vessels between San Francisco and Hongkong or other Oriental ports. The company has a capital stock of $1,000,000, and the incorporators are Capt. Walter R. Rideout, R. L. Hursh, J. W. Sullivan, H. L. Hoffman and F. A. Clarke. Capt. Rideout, well known as head of the Rideout Transportation Company of Oakland, who has been engaged in Bay and River transportation in California for many years, is president of the company, which is to be financed mainly by himself and members of his family; and J. M. Ballentine, a prominent attorney with offices in the Monadnock building, is attorney and treasurer of the corporation.

The company is already getting its work under way, and its headquarters, which have been in the Santa Marina building, will shortly be moved to the Hobart building. Permission has been received from the State Commissioner of Corporations to issue 200,000 shares of common stock at $1 each to Capt. Rideout, in exchange for a contract with the J. D. Barnes Company for the building of the first of two power schooners which are to be built at an estimated cost of $300,000 each. The company is also permitted to sell 750,000 shares of preferred stock at par, $1 per share, to net the company not less than 85. The common stock is to be held in escrow pending further operations.

The J. D. Barnes Company, caulkers and ship carpenters, with offices at 175 Stewart street and shops in Alameda, is preparing to build ways, etc., valued at about $500,000, adjoining the Alaska Packers' Association plant on the Oakland estuary, and will start work on the first of the schooners as soon as possible. The contract with the San Francisco-Hongkong Company calls for the construction of two freight schooners, 250 ft. long over all, 48 ft. in the beam and 24 ft. moulded depth. These are each to be rigged as five masted topmast schooners, with an auxiliary equipment in each of twin 385 h. p. 4-cylinder Skandia semi-Diesel engines. They are to be about the strongest wooden vessels ever built on the Coast. They will be double-deckers, fitted for general cargo, and will have extremely heavy sawed Oregon pine frames, set close, all deck beams braced with natural knees, and will be lined throughout inside with heavy timbers. They will be lighted by electricity, and will have donkey boilers on deck for cargo hoists.

Tentative plans have been made to build about ten vessels for the contemplated service, which is intended to handle freight only; and some of these may be built of steel if it becomes possible to get a steel ship built within a reasonable time.

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New Diesel-Driven Excursion Ship

On the Hudson river a new excursion vessel has just been placed in service, which is noteworthy by reason of her machinery and by reason of her special type of hull. She is engaged in carrying passengers between New York City and Palisades park; and, in future, residents and visitors will be able to have close intercourse with the beauties of the precipitous cliffs, enfoliaged walks, the delightful woods, and mountain scenery of the park, at a cost open to the pockets of all.

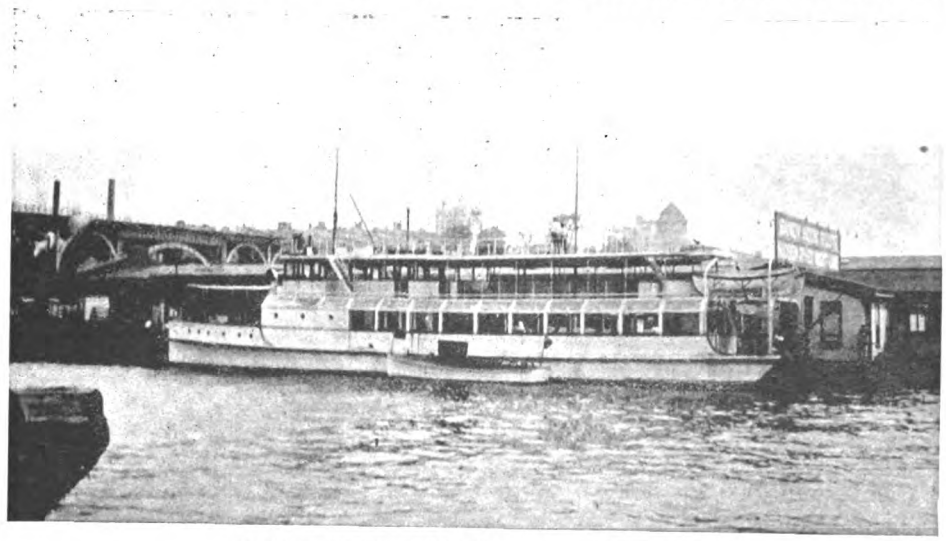
The Palisades Interstate park is made up of four distinct sections—the Palisades, the rock-rimmed edge of New Jersey, beginning at Fort Lee and stretching eleven and a half miles northward. Blauvelt, an acreage lying back from the river, west of Nyack; Hook mountain, a preserve that stretches entirely along the shore front of that rugged mountain promontory commanding the Tappan Zee, and at one point extends back over the summit to Rockland lake; and Bear mountain and Harriman park, a territory that has its shore front in the heart of the picturesque highlands of the Hudson, and extends thence back, over mountains and valleys, taking in primeval forests, lakes and streams, to the valley of the Ramapo river in the neighborhood of Tuxedo.

This land was purchased for $600,000 by a number of wealthy men twelve years ago, thrown open to the public and preserved from vandalism of quarrymen. It is controlled by a board of

BOW OF M. S. "PALISADES"

governors, four for the state of New York, and four for New Jersey, and the controlling authority is known as the Palisades Interstate Park Commission, with Mr. Geo. W. Perkins as chairman. Steamers have been plying along the Palisades, but owing to their draught of water have been unable to keep close to shore where passengers can obtain the best idea of the beauties of the scenery and of the rock formations, so Mr. Perkins decided to build a ship that would be enabled to cruise close in shore, the ultimate result of which decision was the "Palisades," the new vessel that we are about to describe. In order that the cost should not fall upon the public, the entire expense of building her was borne by Mr. Perkins. If she is successful financially, she will be taken over by the Palisades Interstate Park Commission. If not fully appreciated by the people, Mr. Perkins will withdraw her and use her himself as a power house-boat.

No expense has been spared in making the "Palisades" the finest craft in the river-traffic business, and all the fittings, and the sanitary arrangements, are quite up-to-date, and she would need very few changes to make her a most comfortable house-boat. Her length is 111 ft. 6 in. by 28 ft. beam, with 3 ft. 6 in. draught and she has a gross tonnage of 136. Her crew consists of seven men—Capt. W. A. Wilde, Chief Engineer Chas. F. Campbell, the mate, assistant engineer, steward and two deck hands. She is a twin-screw vessel of the tunnel-stern type, and the three decks are so built that each deck is narrower than the other, with the result that she is



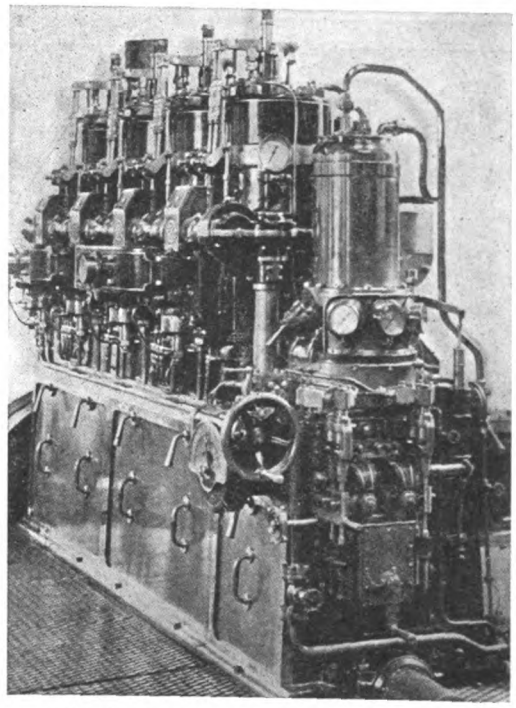
DIESEL ENGINED EXCURSION BOAT "PALISADES"

CHIEF ENGINEER CAMPBELL
In Charge of the "Palisades" Engine Room

quite stable with all the passengers on the top deck crowding to one side. She will carry 350 passengers on the river, or 153 at sea. Her builders were the Mathis Yacht Building Co., of Camden, J. C., which firm also designed her.

To propel her, there are two direct-reversible, four-cylinder, Southwark-Harris "valveless" heavy-oil engines of the two-cycle Diesel type. Each cylinder has a bore of 9 in. by 13 in. stroke and about 160 b. h. p. (240 i. h. p.) is developed at 300 r. p. m. In fact, one engine gave 159 b. h. p. and the other 163 b. h. p. on the test-bed; but in the vessel the engines will be run at about 275 r. p. m. as it is usual to retain a little reserve power with mercantile craft. There also is an auxiliary electric-lighting, air-compressing and bilge-pumping set, driven by a two cylinder Frisbie gasoline engine of 12 h. p.

As regards the main engines, the stepped type of piston has been adopted with the Harris design, but instead of the lower piston of each cylinder being used solely for scavenging, as with some other motors of this design, it is also used as an air motor for starting and manoeuvreing. There is only one valve—the fuel injector—in the cylinder head, except, of course, the little automatic safety, or blow-off valve, for scavenging is carried out entirely by ports. No. 1



PART OF M. S. "PALISADES" POWER PLANT
One of her two 160 h. p. Southwark-Harris Engines

piston scavenges, No. 2 cylinder; No. 2 piston, No. 1 cylinder; No. 3 piston, No. 4 cylinder, and No. 4 piston scavenges No. 3 cylinger. The order of firing is 1, 3, 2, 4.

The cylinders are carried on a cast-iron frame, which is supported on both sides by steel columns direct to the bed-plate, and additionally strengthened by supports on the port side, the studs that hold the cylinders passing down into the columns. By unscrewing the nuts the columns on the starboard side can be removed, allowing the crank shaft to be taken out sideways without disturbing other parts of the engine. This in itself is a very valuable feature of accessibility, and will be specially felt where the motor is installed in an engine room of limited length, and where the bulkheads prevent the crank shaft being drawn

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out endwise. Furthermore any bearing can be removed and replaced without taking out the crank shaft. These features are not exclusive to this engine, but oil engines thus designed are well in the minority. The main bearings are carried right between each set of steel columns, allowing the latter to absorb much of the tension strains given by the pistons on the down stroke. The crank pit is covered by two detachable steel doors on the starboard side. At the forward part of the engine are the high and low-stage air compressor, and intercooler, which charges the storage bottle with air at about 900 lbs. per square inch for fuel injection purposes. On the outer casing of the lower-stage compressor are carried the various pressure gauges, right convenient to the driving mechanic, for at the side is the single control wheel, by which the engine is started, stopped and reversed. On the starboard side is the cam shaft, off which the fuel valves are actuated, and this shaft is operated by means of spur gearing and an inclosed vertical shaft off the forward end of the crank shart.

As is the case with some of the European engines, control and manoeuvering of the motor is arranged by one hand wheel, all controls being interlocked. If she does not get right away on load on the air supply allowed by this wheel control there is a small auxiliary lever allowing extra air to be admitted; but generally this only need be used when very rapid starting or reversing is required. The starting air used is about 225 lbs. per square inch pressure, but 150 lbs. is sufficient.

Fuel to the injection valves is supplied by means of a battery of four eccentric-driven plunger pumps arranged at the forward end of the engine directly under the air compressor. Lubrication is carried out by a battery of pumps, the battery being operated by a disc-crank drive and reduction gear off the after end of the cam shaft, and adjustable sight feeds are provided to all connections.

MOTORBOAT ENGINES FOR $75.

A threehorse power, four-cycle engine, all complete and ready to be set in the boat, all for seventy-five dollars! This is the proposition now being made by the Clift Motor Co. of Bellingham—a live manufacturing concern that has determined to enter a field which has heretofore been monopolized by Eastern factories. A number of the engines have already been sold and are proving highly serviceable and worth the money.

They are also selling six-horsepower for $150 and nine-horsepower for $225—based on $75 per each cylinder.

This engine has all parts interchangeable, and parts for renewal will be furnished at extremely reasonable prices. For instance piston complete with rings, pin and bronze bushing complete for $3.00. Steel connecting rod babbited and bolts, $2.50; valves, 25c each; springs, 10c each; crank shaft, $6.00 complete. This engine is made in multiple cylinders, a 2-cylinder 6 h. p. is $150; a 3-cylinder 9 h. p., $225.

The engine is complete and ready to run including coil, plug, Schebler carbureter, timer, water pump, oil and grease cups. This price does not include tail shaft and propellor equipment. It runs on low grade fuel, distillate and kerosene and the three h. p. burns about one-third of a gallon per hour.

The Clift Motor Company is composed of C. H. Clift and C. X. Folsom. These two young men founded the experiment four years ago and have been able to build it up to considerable proportions. They operate in connection an extensive repair shop for the fitting out and repairing of motor vessels of all classes, the plant being situated conveniently adjacent to the motor boat anchorage of Bellingham.

They have turned out a number of larger sized engines during the last year or two which are operated in the commercial fisheries and which are giving satisfaction.

WILL BUILD SKANDIA ENGINES ON PACIFIC.

J. H. Hansen Co., of San Francisco, are making arrangements to build Skandia engines on the Pacific Coast. The location of the plant has not been definitely determined nor has it been settled as to whether the engines will be built in an existing shop or in a shop put up for the purpose.

Mr. Hansen has recently returned from New York and has brought with him all of the plans and patterns of the different sizes of engines built by the Skandia people. He also brought with him engineers and workmen from the home yard in Sweden and it is his intention that the engines built on the Pacific Coast shall be up to the high standard established by the Swedish concern.

One of the specialties of the Skandia people is the quality of material used in their engines and a chemist has been brought out who will have entire charge of the foundry and testing departments. In the home plant there is a chemical and physical test made of every heat and it is this care that has made the wearability of the Scandia engines.

It is only a few weeks since a license was granted the Marine Oil Engine company of New York to build the Skandia engines in order to take care of the growing business in this country. It speaks well for the shipbuilding on this coast that the company should so soon find it necessary to built another shop. As Mr. Hansen was at one time connected with the Pelton Water Wheel company, it has been suggested that the engines will be built in their shops, but there has been nothing settled in that connection.

RIVER LAUNCH FIRMS PROSPEROUS.

The launch companies making their headquarters at Stockton, Cal., are having an exceptionally busy season, and are constantly adding to their fleet of towboats and barges for the transportation of farm produce, etc., between the river and bay communities. One of the largest of these firms is the Island Transportation company. This company has recently had two new $10,000 tugs built at Stephens Bros.' yard in Stockton, and also bought the big power boat Shima Maru from Geo. Shima, the Japanese potato magnate, together with the barge Taft. The largest recent expansion of the company was the purchase of the entire business of Dixon Bros. Transportation company, including a lot of towboats, barges and other machinery. The company was organized nine years ago by Capt. Benj. Walters, Capt. Jack Curry and D. H. Shepard. Its fleet now includes three speed boats, eighteen towboats, twenty-seven barges and a steamer. This company recently purchased Banner Island, near Stockton, at a price of about $100,000, and is converting the property into a finely equipped shipyard, the site consisting of 12 acres, and including the Banner Island Boat Works, as well as some valuable channel front property suitable for warehouse and manufacturing sites. The company also owns Woods Island, on the Stockton Channel.

Another well-known fleet of river motor boats is that of Wm. Colberg, the pioneer in the motor boat transportation business in the Delta district of California. His boats carry on a daily service between Stockton and the many island communities of the lower river, handling freight and passengers, as well as a special fast passenger and express service. The fleet includes the large freight and towing boats Mabel, Frank C., Nelta, Dell B., Alamo, Tom King, Anteros and the new speed boats William C., Cameo and Alzoe; and a new addition, the C. M. B., a speed launch capable of making 24 miles per hour.

IMPROVE FULTON PLANT.

C. E. Fulton, at Los Angeles Harbor, has rearranged his shop and is building new launching ways for the two new steamers for which he secured the contract in San Francisco some six weeks ago. The steamers are to be sister ships, one of which is for Sudden & Christensen and the other for the J. R. Hanify company. They are to be 235 ft. in length, 43 ft. in width and 17 ft. depth of hold. The carrying capacity will be 1,500,000 feet of lumber each. The make of engines has not as yet been decided upon. The cost will be $112,000 each, and they are to be launched in from six to eight months from date. The lumber for the keel and frames is expected to arrive about Aug. 1. The vessels were designed by D. W. and R. Z. Dickie, of San Francisco.

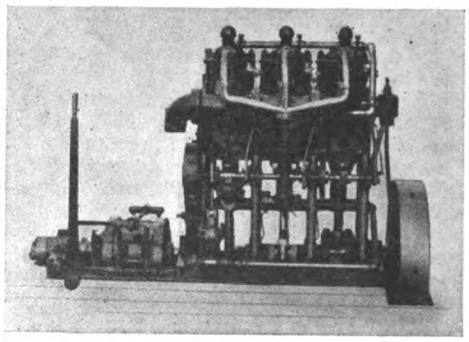
Mr. Fulton now has a handsome office on the second floor of his plant and has installed many new appliances in the remodeled shop, among which are air compressors for boring and hammer work. A wharf where lumber can be landed direct has also been built.

The Los Angeles Harbor department is regrading the corporation yard and putting in new ways for the repair of the barges and boats belonging to the department's fleet. The ways will be 275 feet in length and will take up the immense rock barges now being used to haul rip rap from the quarries at Santa Catalina island.

Garbutt & Walsh, of Terminal, Cal., are building two speed boats, one of which is a sister ship to the Waga, which is now used in carrying the Los Angeles Tribune to Avalon, Catalina Island, arriving there usually shortly after six o'clock a. m. The distance is twenty-two miles. The boats are 38x7½ feet and engines are 100 horse power Sterlings. A tender for the schooner yacht Skidbladnir is also being built which is 28x4 and will be equipped with a 40 horse power Roberts engine.

For genuine hard work in fishing, commercial or pleasure boats, without delay, trouble or complaint, there is no more satisfactory engine made than the

"CLIFT"



5 H. P. to 150 H. P. Open Crosshead and Trunk Piston Types

Let us show you the points of superiority of the **"Clift."**

This engine is designed and built by practical men after many years of gas engine experience.

CLIFT MOTOR COMPANY
Box 226, Waterway, Bellingham, Wash.
Send to us for literature and information

Thomas Broadway, a well known boat builder, has just returned to Los Angeles Harbor, after a tour of practically all of the yards on the North Pacific coast, during which he states that he counted about eighty-five vessels on the stocks. Owing to the fact that charters are still being made for late 1917 loading at practically top notch figures, he is of the opinion that the boat building trade is bound to be brisk for some time to come.

MOTOR BARGE HAS NARROW ESCAPE.

On the morning of June 26th the motor barge Wakena, under charter of the Clatskanie Transportation company, ran head on into Mary Ann bluff at the north end of Active Pass. The barge was making about eight miles an hour at the time, but the bluff is steep just at that point so she did not ground and was soon on her way to Seattle.

The force of the blow stove in her bows somewhat, but the Wakena was evidently built for such work for she arrived in port without taking in any water. After some repairs at the yards of King and Winge she took on about 530 tons of freight and left again for Alaska.

SAN FRANCISCO NOTES.

D. J. Hanlon, of Oakland, has completed his contracts for kelp harvesters for the Hercules Powder company, and the last two barges are now awaiting a tow south. He is now putting up the frames for a large vessel for the Western Fuel company, designed to carry either two million ft. of lumber or 3,500 tons of coal. Her length over all is to be 274 ft., with a beam of 47 ft. and a draft of 24 ft. For the requirements of the coal trade, she is being extra strongly built, with double Oregon pine frames set very close, heavy pine planking, and will have steel arch straps on each side from the height of the deck to the stern post and the stem near the keel; the deck also being diagonally strapped. Her power has not yet been finally determined, but it is believed that she will be equipped with some make of Diesel type engine.

H. Hackfeld & Co.'s new boat for the Hawaiian Islands, named the Kilauea, was launched by H. Anderson about the middle of July, and has gone over to the Union Gas Engine company's plant to be equipped with a 35-h. p. engine, after which she will be shipped to the islands as soon as possible. This is the 38-ft. boat made to be hoisted

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up a cliff, on which Capt. Anderson has been working for about three months. She has a raised engine room amidships, with a pilot house immediately aft, and deck control.

Stone's plant has undergone a complete transformation within the last few weeks. Where formerly the principal work consisted of small pleasure craft and towboats, the yards have been equipped to handle large ship contracts, and the number of employees has been greatly increased. The principal work consists of the two steam schooners for local lumber firms, which are now about ready for planking. The steam engines, built by the Main Street Iron Works, will be of about 1,000 h. p.

The Pacific Navigation company's river freighter San Rafael, powered with twin 35-h. p. Gorham engines, is being overhauled at the Gorham plant.

The Gorham Engineering company, of Oakland, has just filled a rush order for two 50-h. p. engines for Nagasaki, and an order received by wire from Vancouver, B. C., for a 35-h. p. kerosene engine with all accessories, to be shipped by express. The outfit weighed 2½ tons, and the express and duty charges came to nearly as much as the original cost of the engine.

Wm. Cryer, of Oakland, has nearly completed another tow boat for the Crowleys, to be shipped to Central America. It is 40 ft. long, 11 ft. wide and will draw about 5 ft., and is powered with a 30-h. p. Standard engine. It is made extra strong, with full bent oak frame, and iron bark keel and fenders. There is a large cockpit aft, the engine being protected by a hood.

Wm. Cryer is building three 28-ft. launches to be carried by the new W. R. Grace steamers, powered with 10-h. p. Standard engines. They are made strong, but light, for convenience in hoisting to the deck; ironbark keels, light bent oak frames and cedar planking.

Motor boats of over 5 tons capacity, of which there are a large number in the Sacramento and San Joaquin river service, may now register at Stockton, Cal. There has recently been considerable complaint of the necessity to register at San Francisco the boats built at Stockton shops and operated from that city.

Peter Swanson, the Belvedere boat builder, has not yet secured a permanent location on the Oakland side, though he is still looking around. He has been doing some work recently at Keith's shop near Park street bridge.

NEW KELP HARVESTER.

William A. Muller, designer and builder of practically the entire fleet of the Wilmington Transportation company, as well as the power schooner Santa Rosa Island, sold some months ago and taken to the South Sea Islands, the power schooner Vaquero and others, has designed a kelp barge for the American Products company, of Long Beach, Cal. The barge is to be self propelling, with twin screws, driven by two 85-horse-power Union engines. The bids have not as yet been received, but it is expected that they will not be thrown open to all builders, as the owners are extremely anxious for a first class job, regardless of expense. The same theory will apply to the designs for a tug for the same owners, which is to be 75 feet over all by 16 feet in width, also to be driven by an 85-horse power Union.

The kelp companies are apparently not affected by strikes or the failure of the fish to take the hook, but they are reaping enormous profits in the production of potash from kelp, and are in the market for tugs and barges in constantly increasing proportion.

P. A. F. LAYS KEEL OF NEW VESSEL.

On June 26 the Pacific American Fisheries laid the keel of a new vessel at its shipyard in South Bellingham, Wash., which, when completed, will be utilized in transporting supplies to its canneries in Alaska and in bringing back from same the canned product. The vessel is expected to be finished in about six months. It is probable that a sister ship will be started very soon.

U. S. SUBMARINE FOR SPAIN.

The submarine Isaac Peral, the first war craft ever built in this country for Spain, was launched at the Fore River yards at Quincy, Mass., on July 2d. The vessel, named for a Spanish inventor, who experimented years ago with submersibles, is 200 feet long and has a normal cruising radius of 3,500 miles. She is similar in design to the M-type submarines being constructed for the United States. A crew already has arrived to take the Peral to Spain.

Mrs. Juan Riano, wife of the Spanish Ambassador, was sponsor.

The Spanish government is said to have contracted with the Fore River yards for five additional submarines.

MOTORSHIP

The only journal in the world devoted strictly to the commercial motor vessel.

Not a yachting magazine.

Not limited to the Pacific Coast, either in editorial character or circulation.

Not under the influence of advertisers.

"Motorship" is produced by the same organization that publishes "Pacific Fisherman," and is conducted on the same high plane. Its policy is to give its readers the most complete and up-to-date information re the construction and operation of commercial motor vessels of all types, gathered from the leading authorities of the world.

A business publication for business people.

Subscription $2; foreign, $2.50. For sale at news stands of all seaports.

MOTORSHIP

1321 SMITH BLDG. SEATTLE

POWER BOAT CODFISH STATION.

The Union Fish company, of San Francisco, it is reported, is about to build a cod fishing station near the upper end of Unga harbor, Alaska. This station, which is in addition to the company's station now located near the mouth of the harbor, will be supplied with fish by motor boats. It is expected that with boats equipped with gas engines the fishermen will be enabled to visit the outer banks, which are now closed to the dory fishermen owing to their distance from the old Unga station.

OIL ENGINES VS. STEAM MACHINERY.

One feature in connection with which the large marine oil engine scores heavily over its steam rival is in the matter of continuous economy. An oil engine should show approximately as low a consumption of fuel at the end of a long voyage as it did at the beginning. On the other hand, the weight of coal used per h. p. hour in a steam engine increases considerably towards the end of a similar voyage. This feature is mainly accounted for by the condition of the boiler. At the beginning of a voyage, when both sides of the boiler plates are clean, the most economical results should be realized, but the consumption of coal gradually increases as the tubes and combustion chambers become foul, while a layer of scale is slowly forming and thickening on the inside surfaces. Again, the numerous glands and joints subject to a steam pressure of 200 pounds per square inch are very apt to become leaky towards the end of a voyage, and many small leaks from such sources may mean a considerable loss of steam in the aggregate.

A very advantageous feature of the marine oil engine, when compared with steam plant, is its ability to start at any time after a few minutes of preparation. In a large steamship fitted with boilers of the usual type, steam is seldom raised in less than 36 hours. There is no difficulty in raising steam to the working pressure in much less time than this, but it can only be done at the cost of straining the boilers. The time taken

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to raise steam does not necessarily delay a vessel, as this operation is begun while loading or discharging is in progress, but it means a substantial consumption of coal. Again, vessels are not infrequently delayed for one reason or another for a few hours up to several days during a voyage. That is to say, they have to bring up owing to bad weather, fog or some other cause and lie under banked fires ready to proceed at a moment's notice. Banked fires not only consume coal, but they have a particularly bad effect upon the boiler tubes, which become foul very quickly under such conditions and involve extra work for cleaning. The above facts merit the careful attention of shipowners who are about to order new vessels.—Motor Boat & Motor Ship (London).

DANISH MOTORSHIP U-BOAT PREY.

According to a Lloyds dispatch from Tynemouth on July 22nd the Danish motorship Samsoe has been towed to that port in a waterlogged condition after having been shelled by a German submarine. The crew was saved.

NO SCOUT BOATS TO BE BUILT AT MARE ISLAND.

Pacific Coast newspapers generally have been publishing a story in effect as follows:

It is announced that during the coming fall the Mare Island Navy Yard will build several 80-ft. motor scout boats, of the type approved by the navy department. They will be capable of making 30 to 40 miles per hour.

Motorship is glad to be able to present the facts in the form of the following letter:

OFFICE OF THE COMMANDANT
Navy Yard, Mare Island, Vallejo, California,
July 29, 1916.

Editor Motorship:

Your letter of July 25 received. Replying to it I have to state that there is no project on foot to build any motor scout boats at this Navy Yard. An item stating that such boats were to be built here has been going the rounds of the press, but there is nothing to base the supposition on so far as I know, and I would be the first one to know it if true.

I thank you for the copy of Motorship, which arrived in the next mail after your letter, and which I find interesting.

Very truly yours,
F. W. BENNETT,
Captain, U. S. Navy, Commandant.

CANADIAN FISHING CO. ADDS TO FLEET.

The steamers Canada and Imbricaria belonging to the British Columbian Fisheries, Ltd., have been purchased by the Canadian Fishing company, Ltd., from the liquidator. Mr. Hager, while refusing to make public the price at which the vessels were purchased, states that they were bought at a very low figure. The Canada was laid up at Vancouver, and was transferred on the completion of the purchase to the Canadian Fishing company's dock. The Imbricaria was laid up at Skidegate inlet, and was towed to Vancouver by the company's steamer Kingsway. Both vessels are now tied up at the Canadian Fishing company's Vancouver dock, until such time as they can be remodelled for halibut fishing. This will not be done for some little time, owing to the large amount of work which the company has in hand in re-building its Vancouver cold storage plant and warehouse which were destroyed by fire at the end of May last.

BALTIMORE CASHES IN ON PUBLICITY.

The amount of enterprise which is being shown in putting Baltimore prominently on the world's shipping map is indicated by the following advertisement which appeared recently in a half page in "Shipping Illustrated," (N. Y.):

Why The Submarine "Deutschland" Chose Baltimore

Thirty-five feet of water to piers at all tides.
A depth that will float the largest ships.
Unrivaled Manufacturing and Shipping Facilities
Cheap Fuel—Efficient and Reasonable Labor.

Absolutely No Port Charges

Elevator Berths for loading 11 grain ships simultaneously.
Finest Port on the Atlantic Seaboard

H. K. McCAY, Harbor Engineer
BALTIMORE, MD.

Deming & Gould are leading packers and handlers of Canned Salmon and owners of the largest salmon cannery in the world. They have been subscribers to Pacific Fisherman for 15 years. The notation at the bottom of last invoice for their subscription reproduced herewith speaks for itself.

DEMING & GOULD CO.
326 W. MADISON ST.

Chicago,..... 191..

To Pacific Fisherman
Seattle Wash.

We enclose check for account as stated below.

If correct, no acknowledgment necessary.

Yours respectfully,

DEMING & GOULD CO.

Subscription Sept'15 - Sept'16
2 00

Best value for 2.00 we ever received.

PACIFIC FISHERMAN is the authority on the commercial fisheries of the Pacific Coast. Sample free.
1321 Smith Bldg., Seattle.

ANOTHER OIL CARRIER FOR FISHING FLEET.

Al Larsen, the boatbuilder of Los Angeles harbor, has recently laid the keel of a sixty-foot tug for the K. H. Y. company (Japanese). The boat will be equipped with an 80-horsepower Standard engine and will be used to carry oil to the fishing fleet among the islands of the Santa Barbara channel, and also to bring the fish back to the canneries.

SCH. ATHENA TO RETURN TO HER FIRST LOVE.

The halibut power schooner Athena, which came to this coast from Boston with the power schooner Victor and Ethan in 1912, left on July 8 for Boston, where she will engage once more in fishing from that port. Capt. Edward Forbes will be in charge of her on the trip, assisted by Capt. Cantillion as navigating officer. The vessel will go through the Panama Canal. This removes the last of the Boston vessels from this coast, as the Victor and Ethan left for Boston some months ago. The slump which occurred in the halibut fishery of this coast about the time these vessels arrived, and the fishermen's strike, which started early in the year, made it impossible to operate this vessel with profit.

PROSPECTING OREGON HALIBUT BANKS.

On June 2 the halibut fishing schooner Decorah arrived at Astoria on its way to Portland with 30,000 pounds of halibut. This vessel is operating for the Burke Fish company, of Portland, and has made several trips this season.

Several Coos bay launches have been engaged in halibut fishing for some little time. The launch Big Chief returned early in June with over 4,000 pounds of halibut, and a short time previously the same vessel brought in 1,800 pounds. The other vessels, which have remained close to shore, have not done so well.

The power schooner Enterprise, owned by her captain, Joe Johnson, and mate, E. Smith, of Chinook, Wash., sailed for the banks off Yaquina bay on June 26.

Messrs. Carle & Towle, of Seaside, Oregon, have been prospecting off that place recently with the power boat Wolf.

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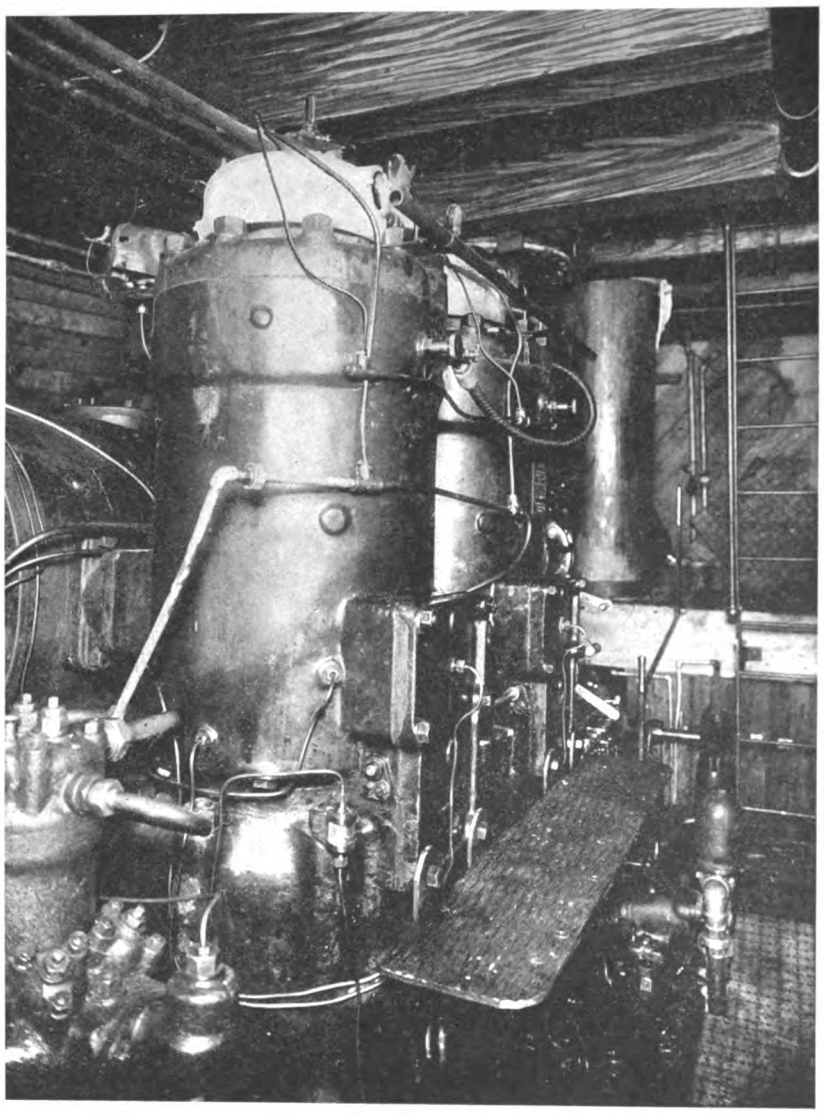
MOTOR SCHOONER "GREAT BEAR" STARTS MAIDEN VOYAGE.



ENGINE ROOM OF "GREAT BEAR"

The three masted auxiliary schooner "Great Bear." Dimensions—Length 140 feet by 32 feet by 13 feet moulded depth. The engine room photo shows the installation of a "Bolinder" 2-cylinder model "M. 1" 160 b. h. p. engine in the above vessel. The installation was made under the supervision of Engineer Murphy, chief engineer, and late of the tug boat "Marie L. Hanlon," of San Francisco, also powered with a "Bolinder" engine. This engine in the "Great Bear" is the first actual installation in Seattle, and in its preliminary trials in and around the harbor, has more than satisfied Captain Louis Lane and Chief Engineer Murphy. The vessel developed a speed of 9 knots under her engine power, which is more than she was expected to do.

Messrs. Henry Lund & Co., of San Francisco, are the Pacific Coast agents for the "Bolinder," and are represented in Seattle by Fawkner Currie & Co., Inc.

Fishermen's Strike Settled

The strike of halibut fishermen which has tied up a number of the larger vessels for about four and one-half months, finally came to an end on July 15, when the fishing vessel owners association and the deep sea fishermen's union of the Pacific came to an agreement on the disputed points in the new agreement submitted to the owners by the union last February. As a result of this action practically all of the Seattle halibut fleet which had been tied up outfitted at once, and in a few days were on their way to the fishing grounds.

The strike proved a very costly one to both owners and fishermen, especially as prices ruled exceedingly high during practically the whole period covered by the strike. While this was due in part to the fact of there being a strike, the principal factor was the great demand from the fresh fish markets for supplies of fish to make up for the shortage of both halibut and salmon.

The high prices induced a number of the Puget Sound purse seiners to engage in the fishery, especially after the halibut appeared on the Flattery banks, which are very conveniently situated for exploitation by the small purse seine vessels. These vessels brought in good catches, for which they received very profitable prices. As a result of the ending of the strike most of these vessels have given up the fishery and gone back to their regular work of salmon fishing.

In the agreement signed both sides gave up or modified certain of their contentions for the sake of harmony. The fishermen won out on one of their demands, which called for settlement to be made in the port where the fish is sold, thus compelling the captain to settle with the crew when the fish are sold in the north instead of waiting until the vessel returns to its home port. The owners won out on provisions requiring the men to pay their back bills, on the paying of substitutes by the fishermen when the latter are not present at the time cargo is being discharged and supplies taken aboard, and on several minor points.

The full text of the agreement follows:

AGREEMENT

No. 1. It is agreed between the Fishing vessel owners' association, inc., and the Deep sea fishermen's union of the Pacific that all members of the crew except the captain and any owner that owns one-fourth or over in his own vessel shall be members of the Deep sea fishermen's union of the Pacific. If cooks or engineers are members of any other maritime union of their craft and are in good standing therein, this union shall claim no jurisdiction over them. Any present member of the Fishing vessel owners' association, not to exceed twelve in number, at any one time, when they own one-fourth or over in any association vessel, may act in any capacity in any association vessel without interference.

No. 2. The share of the vessel shall be one-fifth. The fishermen agree to pay their share of grub, oil, bait, salt, and ice, and to keep the fishing gear in good order, and to replace their share of lost and condemned fishing gear. The following shall be construed as fishing gear: Ground lines, gangings, hooks, beckets, twine, tar, skate covers, skate ropes, files, gaffs, nets, buoys, buoy lines, anchors, knives, scrapers, hose, gurdies, dory rollers, tholepins, and lights. The following items of fishing gear, lost on the fishing ground, shall be taken out of the gross stock: Beckets, twine, ground lines, hooks, gangings, anchors, buoys, and buoylines. Fishing gear shall not be used as ship's gear. Not more than market price to be charged.

No. 3. One fisherman approved by the captain shall attend the weighing of the fish. He must, in the captain's absence, assume all responsibility. Settlement to be made in the port where the fish is sold, and to be made between the captain, or his agent, and the fishermen. After the bills are paid, back bills to be paid as follows: When the share is $25.00 or less, nothing shall be taken out. When the share is over $25.00, one-half of the amount from $25.00 to the full share shall be taken out. If the captain desires to fit out on a cash basis, he shall be empowered to use the proceeds of the voyage for this purpose.

No. 4. When an accident happens to a vessel having fish in board, in which a tow is needed, the full amount of the tow bill shall be taken out of the gross stock. When settlement is made with the tow boat company and the insurance company, if the vessel is insured, such part of the bill as may be left shall be divided between the vessel and the crew in the same manner as it was paid in.

No. 5. A delegate shall be elected in each vessel. He shall see that all members of the crew, as per section 1, are members of the union in good standing. He shall check up the bills with the goods put on board when same is most convenient. In vessels having four dories or over he shall be exempt from fitting out. The cook must be present when stores are taken in to see that he gets what he ordered.

No. 6. The pilot and custom dues shall be paid out of the gross stock.

No. 7. The fishermen agree to discharge fish from tackle to scale. When any fishermen desire to lay off they shall hire substitutes, who shall be members of the union, if obtainable, and notify the captain to that effect. If they neglect to do so the captain may hire substitutes and pay them from $3.00 to $5.00, according to the size of the trip. In case the vessel goes to another port to discharge, the substitute's return fare to be paid, in case the vessel does not return at once.

No. 8. The fishermen agree to pay their share of a watchman's wages when fish and stores are put onboard.

No. 9. Gear that is accepted by the crew coming in shall not be condemned by the crew going out.

No. 10. The fishermen agree to wash out fish holds and decks and to keep the living quarters clean and in good order.

No. 11. When captains intend to discharge any fishermen and any fishermen decide to leave, notice of same shall be given when settlement is made. The fishermen agree to be present and work, when supplies are put onboard. Any member that willfully delays a vessel shall, upon conviction, be fined $2.50.

No. 12. A sufficient number of fishermen shall be onboard and work when ice, oil, bait, and stores are put onboard. Failure to do so shall give the captain the right to discharge them, provided they can give no good reason for their absence.

No. 13. The union agrees to urge upon all its members to pay their share of any broken trip as per section 3.

No. 14. If deckhands or extra men are carried, such men's wages shall be paid by the vessel.

No. 15. Members of this union agree not to work for any vessel or company that will not pay or live up to the terms incorporated in this agreement.

No. 16. All disputes that cannot be settled onboard must be referred to the association and the union for adjustment.

No. 17. All fish not accepted as first or second class must be dumped or destroyed. Failure to do so will be punished by a fine of $2.50 for the first offense and $5.00 for all further violations.

No. 18. It is further agreed that a committee from each organization, mentioned above, will meet on the first Monday in December next, for the purpose of discussing an agreement for the following year.

This agreement to remain in force and effect from date and continuously thereafter unless cancelled by either party hereto by thirty days' notice, such notice to be in writing.

Signed this fifteenth day of July in the year nineteen hundred and sixteen (July 15, 1916).

SAN PEDRO COMPANY BUSY.

The Marine Mechanical Works, of San Pedro, is rapidly getting into shape to do all kinds of machine work and also builds the Gaertner fuel oil and other gasoline and distillate marine engines. The location, immediately fronting the turning basin, near the Pacific Electric and Southern Pacific draw bridge, makes the works easily accessible by both land and water. R. A. Gaertner, the superintendent, invented the Gaertner boat releasing hook, which it is said has let go of a boat proceeding at eighteen knots per hour. He has associated with him Mr. W. B. Slaughter, formerly with John W. Hayes, consulting engineer of Chicago. Mr. Slaughter was the designer of the famous 100-inch telescope now being erected on Mt. Wilson, near Pasadena.

This company is agent for the Pacific Marine Engine company, of Oakland, Cal., the first engine of this type sold here having recently been installed with most satisfactory results in the new fishing boat T. T. I. While rated at 30 horse power the engine developed 32.7 on 360 revolutions. Another engine has been sold on this showing, and it is predicted that other orders will follow.

IMPERIAL SALES AT SAN PEDRO HEAVY.

Matt J. Walsh, superintendent of the San Pedro Transportation company, states that since January, 1914, he has sold forty-three Imperial gas engines. He further states that the launch Peer, which the company uses on the Terminal ferry route, went into commission on Feb. 10, 1912, and has run over 140,000 miles since that time, being in commission nearly the whole of the twenty-four hours of each day. Not over $15 has been spent on the engine for repairs.

The T. F., a team ferry, is also operated by this company, and has been running continuously for over two years with no relief. The boat has a 175-h. p. Imperial engine, with water cooled valves.

Jack Sallee, owner of the fishing boat Sallee, has run his boat four years and has never had the head off of the engine, an Imperial. He attributes its good condition to the fact that he uses one pint of coal oil in each cylinder each week, followed by one quart of good cylinder oil, letting it set over night.

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A VAST MOTOR SHIP INDUSTRY.

Few shipowners are aware of the large number of mercantile motor ships that are equipped with Werkspoor four-cycle type Diesel engines, and that only one other firm has a greater tonnage of ocean-going oil-driven craft to their credit, and that particular concern's yard is entirely devoted to the construction of motor ships, whereas Werkspoor only have been able to devote part of their extensive works to this class of vessel. The Werkspoor Co. have been building stationary Diesel engines in large numbers for nearly 17 years, and marine Diesel engines for seven years. The following is a list of the ships (naval craft excluded) in actual service that are fitted with Werkspoor motors. The "Sebastian" was recently converted from two-cycle Diesel power of other make to Werkspoor four-cycle.

Name and Owners—	Dead Weight Capacity, Tons.	Indicated Horse Power
San Antonio—A. Hammerstein	500	215
Cornelis—J. Van Rompu	600	265
Vulcanus—Anglo-Saxon Pet. Co.....	1,900	500
Sembilan—Royal Packet Co.	300	265
Juno—Anglo-Saxon Pet. Co.	2,675	1,360
Emanuel Nobel—Royal Shell Interests.	6,500	2,750
London—Royal Packet Co.	1,750	1,360
Artemis—Anglo-Saxon Pet. Co.	5,050	2,300
Ares—Anglo-Saxon Pet. Co.	5,050	2,300
Selene—Anglo-Saxon Pet. Co.	5,050	2,300
Hermes—Anglo-Saxon Pet. Co.	5,050	2,300
*Motrocine—Soc. Napthes Trans.	5,200	1,700
Elbruz—Royal Shell Interests	6,500	2,750
Jules Henry—A. Vimont	2,000	1,360
Poseidon—Anglo-Saxon Pet. Co.	800	450
Meyer (Mijer)—Royal Packet Co.....	1,750	1,360
Soberg—Royal Packet Co.	1,750	1,360
Utrecht—Anglo-Saxon Pet. Co.	1,500	800
Lara—Anglo-Saxon Pet. Co.	875	650
Bengkalis—Royal Packet Co.	900	650
Poelongan—Royal Packet Co.	900	650
Sebastian—Lane & McAndrew	5,050	2,300
No. 17—Dutch Colonies Gov't.	1,000	900
No. 22—Dutch Colonies Gov't.	1,000	900
Total	63,650	31,755

The *Motrocine was engined by a Werkspoor Licensee.

It will be seen that altogether there are 24 Werkspoor Diesel engined ships in service, but many more are on order, in fact their works at Amsterdam are overflowing with various orders. With auxiliary motors, the above engines must represent a turnover of over $2,000,000—this, of course, not including the ships and fittings, which will indicate how vast a business the marine oil engine is to this firm alone.

SUBMARINE SALVAGES CARGOES

Simon Lake has about finished in the Bridgeport shipyards of his company a new type of submarine boat that will be used to salvage cargoes from vessels sunk during the war. Mr. Lake announced recently that he expected to begin operations in the English Channel in a couple of months.

Mr. Lake will also raise the many cargoes of coal sunk in shallow waters around New York harbor and along the New England coast. He has already raised one cargo of copper with his system which does away with deep-sea diving and enables wreckers to work on sunken ships as many hours as necessary without being forced to come to the surface.

Application was made a short time ago to list on the New York Curb stock of the Argonaut Salvage Corporation of Connecticut which controls the patents and will operate the boats. Capitalization is $3,500,000, par $100, and $1,000,000 being preferred.

UNION PLANT BUSY.

The Union Gas Engine company's plant has been working two shifts ever since the first of the year, and is just as busy as ever, frequently finding it necessary to keep running Sundays. Recent additions to the plant are an oxy-acetylene welding outfit, blacksmith shop and heat treating plant. On the floor July 15 were two 150-h. p. engines, two 135's, and one 110, as well as a lot of smaller engines ready to go out, and several others in the testing room.

ANOTHER PERUVIAN POWER SCHOONER LAID DOWN.

Schultz, Robertson & Schultz, the Hunters Point boat builders, have just booked a contract for a sister to the power schooner "Terza Italia," which they are now completing for the Angelo Farce company of Callao. The new boat will be 2 in. deeper than the Terza Italia, the lines otherwise being practically the same. The general dimensions will be: Length, 85 ft.; beam, 24 ft.; draft, 9 ft., and she will be powered with a 225-h. p. Skandia Diesel engine. She will be heavily built of Oregon pine, galvanized iron fastened and with copper sheathing on the bottom. She will have a schooner rig, with enough sail area to get along without the engines in a good wind. She is designed, however, mainly for use as a towboat, only a comparatively small cargo space being provided for in hold and on deck. Most of the space below is taken by crew's quarters and engine room, fuel and water tanks, etc., while there will be a large cabin occupying the deck astern, with comfortable accommodations for several passengers, galley, officers' quarters, etc., and a pilot house above. The Terza Italia is about ready for launching.

The same parties have ordered a smaller open towboat, the contract for which has been turned over to H. Anderson, also on Hunters Point. This will be 30 ft. long, 9 ft. in the beam, and about 4 ft. deep, the power being furnished by a 30-h. p. single cylinder Skandia Diesel engine. Like the larger boats, she is copper sheathed. The bottom timbers are all oak, frames bent; the stern fantail, a hood forward, and the rest of the boat open.

MOTORSHIP CONSTRUCTION DELAYED.

The construction of motor vessels at all the yards of the San Francisco district, and especially of vessels of the larger class, has been greatly delayed during the last month by the waterfront strike, which has made it impossible for the builders to get any large amount of lumber. In some cases work has been entirely suspended for a time, though as a rule it has been possible to keep a few of the men busy all the time. While some phases of the labor trouble are now being settled, indications are that the lumber trade will be greatly hampered for some time to come, and the shipbuilders are wondering when they will be able to finish their contracts.

The strike has also made matters difficult for some of the launch and lighterage firms on the bay. The Crowleys had been figuring on taking some of their barges out for repairs at their new yard in Oakland, but a lot of the barges were loaded, and for some time it was impossible to get the cargo removed. The Peterson Launch company has been put to some trouble by the strike, but in spite of that reports so much business that it has been impossible to get to work on a new boat that has been contemplated for some time. The regular river steamer service to Sacramento and Stockton was completely tied up for several weeks, and a great deal of this traffic was handled by the gasoline boats, the emergency giving the river fleet of small craft about all they could handle.

OIL MOTORS FOR OIL BARGE.

The big schooner rigged oil barge Nuuanu, of the General Petroleum company, is to be converted into a motorship, and has been at San Francisco for the last week to undergo the preliminary changes. The engine, a 320-h. p. Bolinder, is expected shortly and will be installed immediately on arrival. The Nuuanu is a vessel of 1028 gross tons, capable of handling 10,000 bbls. of oil. She is 211 ft. 3 in. long, 34 ft. wide and draws 9 ft. 6 in. of water. This installation is especially interesting as being the first single-screw outfit of any size to be equipped with a Bolinder engine on the Pacific Coast.

STORY OF THE "DEUTSCHLAND"

(Continued from Page 4)

The navies of France, Great Britain, and Russia have been the principal sufferers in the matter of lives lost during experiments with their submarines. France lost 77 officers and men during four accidents, and Great Britain lost 76 men from her navy in six accidents which have occurred in the English Channel.

Only one United States submarine has ever foundered.

Results of the "Deutschland's" Voyage.

Industrially the breaking of the blockade has proved of considerable value. The 320 tons of dye stuffs which she brought to this country helped greatly to relieve a situation which was becoming very acute and which might have resulted in a general tie up of many plants here this fall. The return cargo of nickel and rubber which the "Deutschland" is taking is badly needed in Germany, the rubber shortage being felt most at the field hospitals where the German surgeons are sorely in want of rubber gloves.

No securities were brought over by the "Deutschland," though a shipment of gold, the exact amount of which was unknown, was shipped back. Insurance on this was underwritten by patriotic New York Germans at 5 per cent. The arrival of the "Deutschland" had a slight but purely sentimental effect upon Reichmark exchange in New York. A large package of diplomatic communications from Ambassador von Bernstorff were taken on board for the return trip.

It is reported from Munich via Geneva that the German government is establishing a scale of rates for an undersea postal service to be handled by the line of which the "Deutschland" is the first boat, government correspondence to have precedence.

Many offers, some as high as $5,000, were made for passage to Germany on the "Deutschland" and this in combination with the greatly augmented prices on the commodities which would be carried would seem to show that the service could be operated at a profit despite the unusual expense of construction and the limited amount of cargo and the few passengers which might possibly be carried.

Entirely aside from the material considerations Germany has gained tremendously from the "Deutschland" because in re-establishing direct connections with the United States the interest of America in the German's side of the Great War has been quickened. A huge amount of good will has reverted again to the German people and much of the animus on both sides has been quieted.

The visit of the "Deutschland" has stimulated even further the American interest in preparedness. Naval authorities have pointed out that the "Deutschland's" arrival has shown how easily it would be possible for a fleet of hostile submarines to descend upon our port, annihilate our shipping and seriously cripple our navy.

A whole new problem has been presented the solution of which may revolutionize many things in shipping and naval practice which have been looked upon as fixed. Dr. Franz Erich Junge, for instance, recommends the subsidy of a large fleet of diving merchantmen because of the valuable auxiliary service which they would render in time of war. In peace times it might be somewhat difficult for vessels of this type to compete with ordinary water carriers because of their limited cargo carrying capacity, although their heavy oil motors would give them an advantage over steamers. With the aid of government subsidy, such as Germany gives to motor lorries because of their war value, these boats could be operated in commerce in normal times profitably and would be available in time of disturbance. They would, for example, make it possible for a fleet to operate far from its base, and even through a blockade, by carrying stores, fuel, etc., under water. They would not, of course, lose their peaceful character under ordinary circumstances any more than do the trawlers, which are used in mine sweeping or submarine snaring. In this connection the remarks of Mr. Davidson, of the New London Ship and Engine Co., printed elsewhere in this paper, are worthy of careful consideration. Mr. Davidson points out the possibility of converting vessels of this type designed for war service into ordinary carriers of commerce.

The value of the voyage to the marine oil engine industry in the United States should be great. Long sea voyages of this sort furnish experience far more dependable that shop tests and from such experience the material for progress will be drawn. The voyage has served further to point out how dependent we have been upon foreign makers for diesel and general heavy oil engine development and it is hoped that the heightened interest will lead to government encouragement and co-operation being extended to the greatest possible degree to the concerns who are now trying to develop the oil motor in the United States.

SUBMARINE CATCHING.

The return trip of the "Deutschland," of course, will be more hazardous, because the exact date and time of sailing will be known by the watching warships, and so it will be easier for the latter to search for and follow the bubbles. Apart from the escaping foul air, the propellers churn up quite a wake, which comes to the surface.

One of the methods adopted to catch submarines when in fairly shallow water—say 50 to 85 feet—is for three destroyers to encircle the spot indicated by the bubbles at full speed, gradually reducing the radius, but without slackening speed, until the water within the circle has been created into a terrific vortex. The whirlpool renders navigation of the submarine impossible, and she twirls about helpless in the swirling waters, eventually rising to the surface regardless of the efforts of her crew to keep her submerged. Then the guns of the destroyers are trained upon her, and another submarine goes to a watery grave. Naval men in days of war have no time for sentimental thoughts. It is destruction of the enemy or they themselves will be destroyed.

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